Archaeological Resources

Airport Vicinity Development Checklist

Parking Study

Trip Generation Comparison

Parking Master Plan

Memo: 75 on 2nd – Trip Generation Comparison

Date: 01/21/19
TO: City of Scottsdale
FROM: Eric Maceyko, P.E., PTOE
Bryan Martin, P.E.

INTRODUCTION

K & I Homes is planning a new multi-family residential development, named 75 on 2nd, that will encompass four existing occupied lots located within the downtown area of Scottsdale, Arizona. It is located on the northeast corner of 75th Street and 2nd Street. The new proposed development includes 39 new apartment dwelling units within a four-story building on a total gross area of 1.09 acres.

RESULTS

Table 1 provides the anticipated trip generation for the proposed development during the day and peak hours of traffic for a typical weekday.

Table 1: Trip Generation – Proposed Development

Time Period	Day			AM Peak Hour			PM Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Multi-Family (ITE LUC 221)	106	106	212	4	12	16	11	7	18

The proposed multi-family development is anticipated to generate more daily traffic, morning exiting traffic and evening entering traffic than the existing development during the typical weekday. It is also anticipated to generate less morning entering traffic and evening exiting traffic than the existing development during the typical weekday.

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Figure 1 provides an aerial photograph of the proposed development vicinity and the adjacent streets. The proposed development will encompass the existing Lots 10-13 on the north side of 2nd Street east of 75th Street. The existing lots contain three standalone single-story buildings with office uses. The following building areas are currently provided:

- Lot 10 – 1,424 square feet
- Lot 11 – 1,065 square feet
- Lots 12 & 13 – 5,348 square feet

The surrounding area consists of a diverse mixture of residential, office and retail uses. Scottsdale City Hall, the Civic Center, the Scottsdale Stadium and the Civic Center Library are all located adjacent to the proposed site on the west side of 75th Street.

Figure 2 provides the proposed site plan. The building will contain four stories of development. The ground floor will consist of parking, a lobby and amenities with the 39 dwelling units contained on the above three floors. All vehicular access will be provided by the existing alley along the northern edge of the site which currently connects to 75th Street on the west and Miller Road on the east. A total of four (4) separate driveways will be provided to the existing alley.

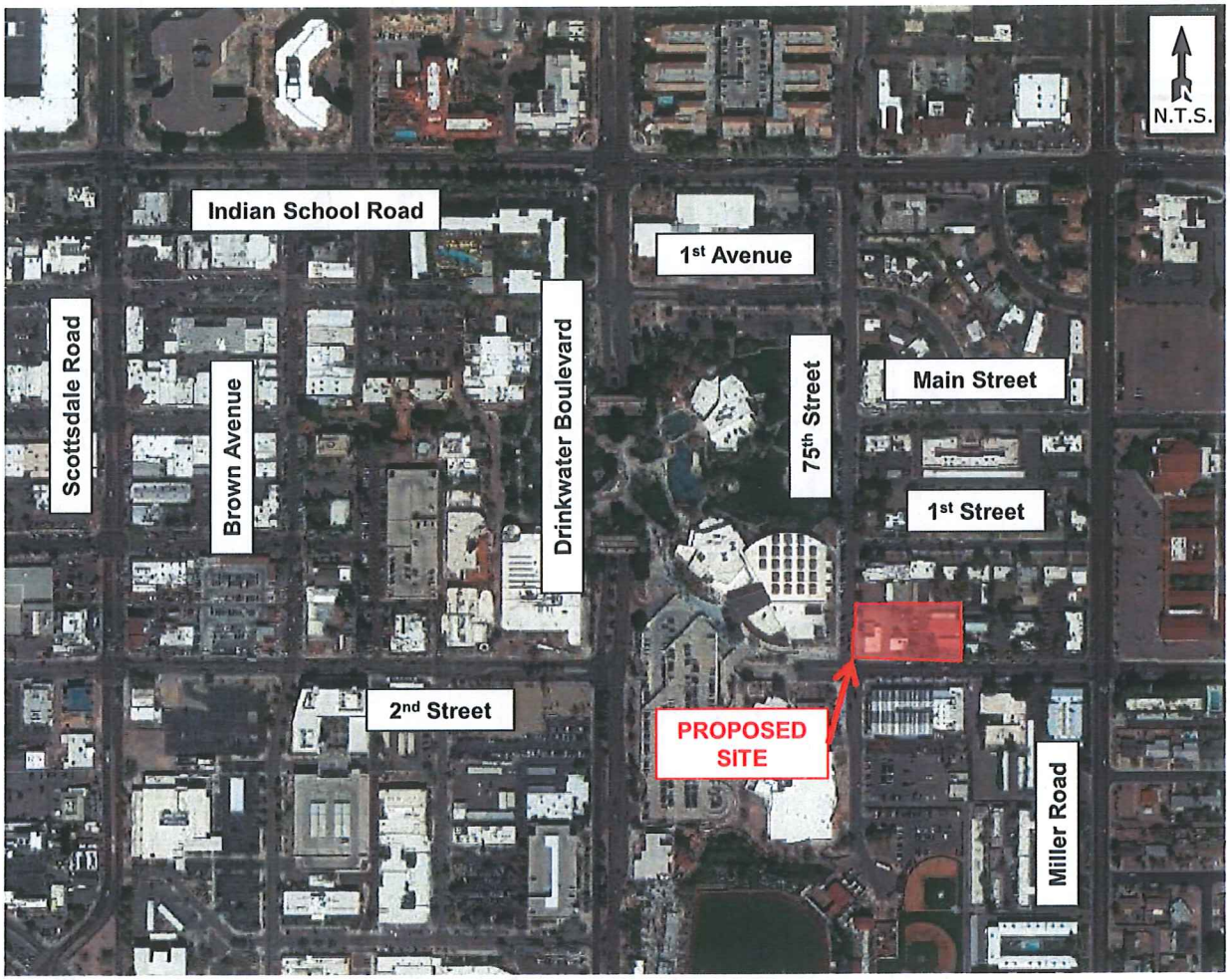


Figure 1: Vicinity Map

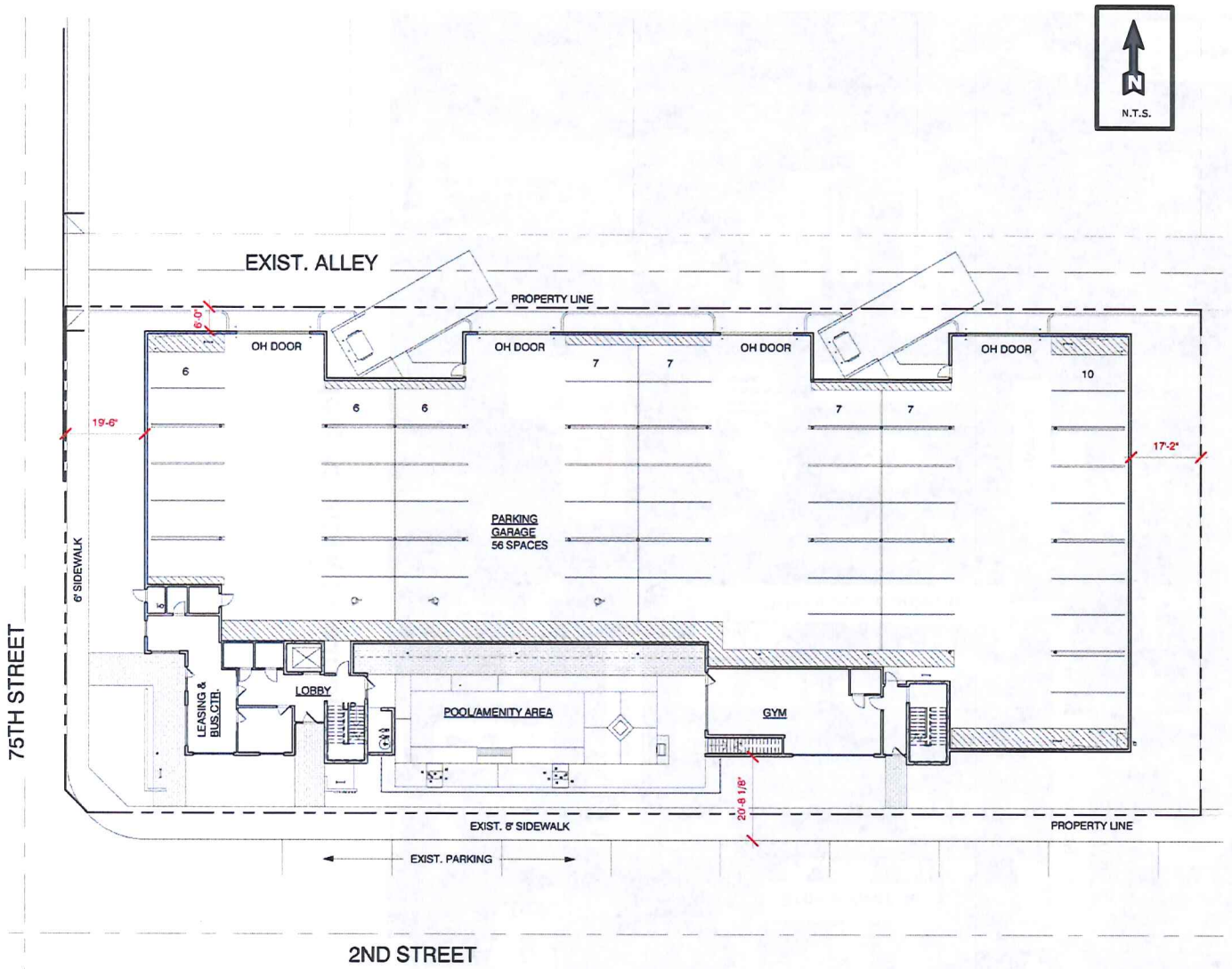


Figure 2: Proposed Site Plan

TRIP GENERATION – EXISTING DEVELOPMENT

The estimated trip generation was determined through the procedures and data contained within *Trip Generation* (*10th Edition*), published by the Institute of Transportation Engineers (ITE) in 2017. This document provides traffic volume data from existing developments throughout North America that can be utilized to estimate vehicle trips that might be generated from developments. The traffic data are provided for 175 different categories. The estimated traffic volume is dependent upon independent variables defined by the characteristics and size of each land use category. Trip generation was conducted for the existing and proposed developments as detailed below.

There is considerable data for office developments. Based on the size and tenants for the existing buildings, ITE Land Use Code 710: General Office Building contains the most appropriate data for Lots 12 & 13, and ITE Land Use Code 712: Small Office Building contains the most appropriate data for Lot 10 and Lot 11. The independent variable utilized to predict trips is 1,000 Square Feet Gross Floor Area. This independent variable has acceptable statistical attributes and therefore can be utilized. Volumes utilizing the independent variable were calculated for each time period. In some cases both equations and average rates are provided in *Trip Generation*. The largest volumes considering both calculation methods were utilized as the estimate for the generated traffic for the existing development. It should be noted that the average rate was utilized for ITE Land Use Code 710 for the morning peak hour since the equation produced an unrealistically high estimate for a building of this size.

Appendix A provides the complete results of these calculations. **Table 2** summarizes the total trip generation for the existing development during the day and peak hours of traffic for a typical weekday.

Table 2: Trip Generation – Existing Development

	Day			AM Peak Hour			PM Peak Hour		
Time Period	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Lot 10 (ITE LUC 712)	12	11	23	2	1	3	1	2	3
Lot 11 (ITE LUC 712)	9	8	17	2	0	2	1	2	3
Lots 12 & 13 (ITE LUC 710)	31	31	62	5	1	6	1	6	7
TOTAL	**52**	**50**	**102**	**9**	**2**	**11**	**3**	**10**	**13**

TRIP GENERATION – PROPOSED DEVELOPMENT

There is considerable data for multi-family residential developments. The proposed development is planned to have a four-story building. Therefore, ITE Land Use Code 221, Multifamily Housing (Mid-Rise), contains the most appropriate data for use in the trip generation analysis. Three independent variables are available for this land use category to predict trips: dwelling units, occupied dwelling units and residents. All three have adequate statistical attributes and therefore are acceptable for use. The number of residents is currently unknown. Therefore, volumes utilizing the number of dwelling units and occupied dwelling units were calculated for each time period. It was assumed that all dwelling units were occupied.

Both equations and average rates are provided in *Trip Generation*. Both methods were calculated separately for each time period. The largest volumes considering both independent variables and calculation methods were utilized as the estimate for the generated traffic for the proposed development.

Appendix B provides the complete results of these calculations. **Table 3** summarizes the trip generation for the proposed development during the day and peak hours of traffic for a typical weekday.

Table 3: Trip Generation – Proposed Development

	Day			AM Peak Hour			PM Peak Hour		
Time Period	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Multi-Family (ITE LUC 221)	106	106	212	4	12	16	11	7	18

TRIP GENERATION COMPARISON

Table 4 provides a comparison of the total trip generation for the existing and proposed development during the day and peak hours of traffic for a typical weekday.

Table 4: Trip Generation Comparison

TIME PERIOD	PREVIOUS	PROPOSED	COMPARISON
WEEKDAY			
Total	102	212	110
Enter	52	106	54
Exit	50	106	56
AM PEAK HOUR			
Total	11	16	5
Enter	9	4	-5
Exit	2	12	10
PM PEAK HOUR			
Total	13	18	5
Enter	3	11	8
Exit	10	7	-3

The proposed multi-family development is anticipated to generate more daily traffic, morning exiting traffic and evening entering traffic than the existing development during the typical weekday. It is also anticipated to generate less morning entering traffic and evening exiting traffic than the existing development during the typical weekday.

Please contact me at (480) 503-2250, extension 1125 if you have any questions or would like to discuss this memorandum.

ATTACHMENTS:

A. Existing Development Trip Generation
B. Proposed Development Trip Generation

Expires:6/30/2020

ATTACHMENT A
EXISTING DEVELOPMENT TRIP GENERATION

PROJECT	75 ON 2ND			
PARCEL	EXISTING LOT 10			
ITE LAND USE CATEGORY AND CODE	SMALL OFFICE BUILDING (712)			
INDEPENDENT VARIABLE	1,000 SQUARE FEET GFA			
SIZE	1.424			
		TRIPS		
		ENTERING	EXITING	TOTAL
***WEEKDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	17			
AVERAGE SIZE	2			
MINIMUM RATE	4.44	3	3	6
AVERAGE RATE	16.19	12	11	23
MAXIMUM RATE	50.91	36	36	72
STANDARD DEVIATION	11.03			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**12**	**11**	**23**
AM PEAK HOUR ADJACENT STREET		83%	17%	
NUMBER OF STUDIES	17			
AVERAGE SIZE	2			
MINIMUM RATE	0.78	1	0	1
AVERAGE RATE	1.92	2	1	3
MAXIMUM RATE	4.12	5	1	6
STANDARD DEVIATION	0.97			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**2**	**1**	**3**
AM PEAK HOUR GENERATOR		60%	40%	
NUMBER OF STUDIES	18			
AVERAGE SIZE	2			
MINIMUM RATE	1.08	1	1	2
AVERAGE RATE	3.26	3	2	5
MAXIMUM RATE	7.83	7	4	11
STANDARD DEVIATION	1.54			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**3**	**2**	**5**
PM PEAK HOUR ADJACENT STREET		32%	68%	
NUMBER OF STUDIES	17			
AVERAGE SIZE	3			
MINIMUM RATE	0.56	0	1	1
AVERAGE RATE	2.45	1	2	3
MAXIMUM RATE	5.50	3	5	8
STANDARD DEVIATION	1.38			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**1**	**2**	**3**
PM PEAK HOUR GENERATOR		46%	54%	
NUMBER OF STUDIES	18			
AVERAGE SIZE	2			
MINIMUM RATE	0.56	0	1	1
AVERAGE RATE	3.73	2	3	5
MAXIMUM RATE	9.14	6	7	13
STANDARD DEVIATION	2.37			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**2**	**3**	**NA**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	EXISTING LOT 10			
ITE LAND USE CATEGORY AND CODE	SMALL OFFICE BUILDING (712)			
INDEPENDENT VARIABLE	1,000 SQUARE FEET GFA			
SIZE	1.424			
		TRIPS		
	RATE	ENTERING	EXITING	SUM
***SATURDAY* DAILY**		NA	NA	
NUMBER OF STUDIES	NA			
AVERAGE SIZE	NA			
MINIMUM RATE	NA	NA	NA	NA
AVERAGE RATE	NA	NA	NA	NA
MAXIMUM RATE	NA	NA	NA	NA
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**NA**	**NA**	**NA**
PEAK HOUR GENERATOR		50%	50%	
NUMBER OF STUDIES	1			
AVERAGE SIZE	5			
MINIMUM RATE	0.40	1	0	1
AVERAGE RATE	0.40	1	0	1
MAXIMUM RATE	0.40	1	0	1
STANDARD DEVIATION	1.29			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**1**	**0**	**1**
***SUNDAY* DAILY**		NA	NA	
NUMBER OF STUDIES	NA			
AVERAGE SIZE	NA			
MINIMUM RATE	NA	NA	NA	NA
AVERAGE RATE	NA	NA	NA	NA
MAXIMUM RATE	NA	NA	NA	NA
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**NA**	**NA**	**NA**
PEAK HOUR GENERATOR		NA	NA	
NUMBER OF STUDIES	NA			
AVERAGE SIZE	NA			
MINIMUM RATE	NA	NA	NA	NA
AVERAGE RATE	NA	NA	NA	NA
MAXIMUM RATE	NA	NA	NA	NA
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**NA**	**NA**	**NA**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	EXISTING LOT 11			
ITE LAND USE CATEGORY AND CODE	SMALL OFFICE BUILDING (712)			
INDEPENDENT VARIABLE	1,000 SQUARE FEET GFA			
SIZE	1.065			
		TRIPS		
		ENTERING	EXITING	TOTAL
***WEEKDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	17			
AVERAGE SIZE	2			
MINIMUM RATE	4.44	3	2	5
AVERAGE RATE	16.19	9	8	17
MAXIMUM RATE	50.91	27	27	54
STANDARD DEVIATION	11.03			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**9**	**8**	**17**
AM PEAK HOUR ADJACENT STREET		83%	17%	
NUMBER OF STUDIES	17			
AVERAGE SIZE	2			
MINIMUM RATE	0.78	1	0	1
AVERAGE RATE	1.92	2	0	2
MAXIMUM RATE	4.12	3	1	4
STANDARD DEVIATION	0.97			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**2**	**0**	**2**
AM PEAK HOUR GENERATOR		60%	40%	
NUMBER OF STUDIES	18			
AVERAGE SIZE	2			
MINIMUM RATE	1.08	1	0	1
AVERAGE RATE	3.26	2	1	3
MAXIMUM RATE	7.83	5	3	8
STANDARD DEVIATION	1.54			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**2**	**1**	**3**
PM PEAK HOUR ADJACENT STREET		32%	68%	
NUMBER OF STUDIES	17			
AVERAGE SIZE	3			
MINIMUM RATE	0.56	0	1	1
AVERAGE RATE	2.45	1	2	3
MAXIMUM RATE	5.50	2	4	6
STANDARD DEVIATION	1.38			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**1**	**2**	**3**
PM PEAK HOUR GENERATOR		46%	54%	
NUMBER OF STUDIES	18			
AVERAGE SIZE	2			
MINIMUM RATE	0.56	0	1	1
AVERAGE RATE	3.73	2	2	4
MAXIMUM RATE	9.14	5	5	10
STANDARD DEVIATION	2.37			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**2**	**2**	**NA**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	EXISTING LOT 11			
ITE LAND USE CATEGORY AND CODE	SMALL OFFICE BUILDING (712)			
INDEPENDENT VARIABLE	1,000 SQUARE FEET GFA			
SIZE	1.065			
		TRIPS		
	RATE	ENTERING	EXITING	SUM
***SATURDAY* DAILY**		NA	NA	
NUMBER OF STUDIES	NA			
AVERAGE SIZE	NA			
MINIMUM RATE	NA	NA	NA	NA
AVERAGE RATE	NA	NA	NA	NA
MAXIMUM RATE	NA	NA	NA	NA
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**NA**	**NA**	**NA**
PEAK HOUR GENERATOR		50%	50%	
NUMBER OF STUDIES	1			
AVERAGE SIZE	5			
MINIMUM RATE	0.40	0	0	0
AVERAGE RATE	0.40	0	0	0
MAXIMUM RATE	0.40	0	0	0
STANDARD DEVIATION	1.29			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**0**	**0**	**0**
***SUNDAY* DAILY**		NA	NA	
NUMBER OF STUDIES	NA			
AVERAGE SIZE	NA			
MINIMUM RATE	NA	NA	NA	NA
AVERAGE RATE	NA	NA	NA	NA
MAXIMUM RATE	NA	NA	NA	NA
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**NA**	**NA**	**NA**
PEAK HOUR GENERATOR		NA	NA	
NUMBER OF STUDIES	NA			
AVERAGE SIZE	NA			
MINIMUM RATE	NA	NA	NA	NA
AVERAGE RATE	NA	NA	NA	NA
MAXIMUM RATE	NA	NA	NA	NA
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**NA**	**NA**	**NA**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	EXISTING LOTS 12 & 13			
ITE LAND USE CATEGORY AND CODE	GENERAL OFFICE BUILDING (710)			
INDEPENDENT VARIABLE	1,000 SQUARE FEET GFA			
SIZE	5.348			
		TRIPS		
		ENTERING	EXITING	TOTAL
***WEEKDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	66			
AVERAGE SIZE	171			
MINIMUM RATE	2.71	7	7	14
AVERAGE RATE	9.74	26	26	52
MAXIMUM RATE	27.56	74	73	147
STANDARD DEVIATION	5.15			
EQUATION: LN (T) = 0.97 * LN(X) + 2.50	R^2 = 0.83	31	31	62
LARGEST OF AVERAGE OR EQUATION		**31**	**31**	**62**
AM PEAK HOUR ADJACENT STREET		86%	14%	
NUMBER OF STUDIES	35			
AVERAGE SIZE	117			
MINIMUM RATE	0.37	2	0	2
AVERAGE RATE	1.16	5	1	6
MAXIMUM RATE	4.23	20	3	23
STANDARD DEVIATION	0.47			
EQUATION: T = 0.94 * (X) + 26.49	R^2 = 0.85	28	4	32
LARGEST OF AVERAGE OR EQUATION		**28**	**4**	**32**
AM PEAK HOUR GENERATOR		88%	12%	
NUMBER OF STUDIES	228			
AVERAGE SIZE	209			
MINIMUM RATE	0.57	3	0	3
AVERAGE RATE	1.47	7	1	8
MAXIMUM RATE	4.93	23	3	26
STANDARD DEVIATION	0.60			
EQUATION: LN (T) = 0.88 * LN(X) + 1.06	R^2 = 0.84	11	2	13
LARGEST OF AVERAGE OR EQUATION		**11**	**2**	**13**
PM PEAK HOUR ADJACENT STREET		16%	84%	
NUMBER OF STUDIES	32			
AVERAGE SIZE	114			
MINIMUM RATE	0.47	0	3	3
AVERAGE RATE	1.15	1	5	6
MAXIMUM RATE	3.23	3	14	17
STANDARD DEVIATION	0.42			
EQUATION: LN (T) = 0.95 * LN(X) + 0.36	R^2 = 0.88	1	6	7
LARGEST OF AVERAGE OR EQUATION		**1**	**6**	**7**
PM PEAK HOUR GENERATOR		18%	82%	
NUMBER OF STUDIES	243			
AVERAGE SIZE	205			
MINIMUM RATE	0.49	1	2	3
AVERAGE RATE	1.42	1	7	8
MAXIMUM RATE	6.20	6	27	33
STANDARD DEVIATION	0.61			
EQUATION: T = 1.10 * (X) + 65.39	R^2 = 0.82	13	58	71
LARGEST OF AVERAGE OR EQUATION		**13**	**58**	**NA**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	EXISTING LOTS 12 & 13			
ITE LAND USE CATEGORY AND CODE	GENERAL OFFICE BUILDING (710)			
INDEPENDENT VARIABLE	1,000 SQUARE FEET GFA			
SIZE	5.348			
		TRIPS		
	RATE	ENTERING	EXITING	SUM
***SATURDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	5			
AVERAGE SIZE	94			
MINIMUM RATE	1.24	4	3	7
AVERAGE RATE	2.21	6	6	12
MAXIMUM RATE	7.46	20	20	40
STANDARD DEVIATION	1.70			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**6**	**6**	**12**
PEAK HOUR GENERATOR		54%	46%	
NUMBER OF STUDIES	3			
AVERAGE SIZE	82			
MINIMUM RATE	0.30	1	1	2
AVERAGE RATE	0.53	2	1	3
MAXIMUM RATE	1.57	4	4	8
STANDARD DEVIATION	1.29			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**2**	**1**	**3**
***SUNDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	5			
AVERAGE SIZE	94			
MINIMUM RATE	0.19	1	0	1
AVERAGE RATE	0.70	2	2	4
MAXIMUM RATE	3.05	8	8	16
STANDARD DEVIATION	0.77			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**2**	**2**	**4**
PEAK HOUR GENERATOR		58%	42%	
NUMBER OF STUDIES	3			
AVERAGE SIZE	82			
MINIMUM RATE	0.11	1	0	1
AVERAGE RATE	0.21	1	0	1
MAXIMUM RATE	0.67	2	2	4
STANDARD DEVIATION	0.52			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**1**	**0**	**1**

EPS GROUP

ATTACHMENT B
PROPOSED DEVELOPMENT TRIP GENERATION

PROJECT	75 ON 2ND			
PARCEL	PROPOSED DEVELOPMENT			
ITE LAND USE CATEGORY AND CODE	MULTIFAMILY HOUSING (MID-RISE) (221)			
INDEPENDENT VARIABLE	MAX OF DWELLING UNITS & OCCUPIED DWELLING UNITS			
SIZE	39 DWELLING UNITS & 39 OCCUPIED DWELLING UNITS			
		TRIPS		
		ENTERING	EXITING	TOTAL
***WEEKDAY* DAILY**				
MINIMUM RATE		58	57	115
AVERAGE RATE		106	106	212
MAXIMUM RATE		244	244	488
STANDARD DEVIATION				
EQUATION		106	105	211
LARGEST OF AVERAGE OR EQUATION		**106**	**106**	**212**
AM PEAK HOUR ADJACENT STREET				
MINIMUM RATE		4	10	14
AVERAGE RATE		4	12	16
MAXIMUM RATE		16	47	63
STANDARD DEVIATION				
EQUATION		4	10	14
LARGEST OF AVERAGE OR EQUATION		**4**	**12**	**16**
AM PEAK HOUR GENERATOR				
MINIMUM RATE		4	10	14
AVERAGE RATE		4	12	16
MAXIMUM RATE		8	22	30
STANDARD DEVIATION				
EQUATION		4	12	16
LARGEST OF AVERAGE OR EQUATION		**4**	**12**	**16**
PM PEAK HOUR ADJACENT STREET				
MINIMUM RATE		7	4	11
AVERAGE RATE		10	7	17
MAXIMUM RATE		26	17	43
STANDARD DEVIATION				
EQUATION		11	7	18
LARGEST OF AVERAGE OR EQUATION		**11**	**7**	**18**
PM PEAK HOUR GENERATOR				
MINIMUM RATE		7	4	11
AVERAGE RATE		11	8	19
MAXIMUM RATE		29	20	49
STANDARD DEVIATION				
EQUATION		12	8	20
LARGEST OF AVERAGE OR EQUATION		**12**	**8**	**20**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	PROPOSED DEVELOPMENT			
ITE LAND USE CATEGORY AND CODE	MULTIFAMILY HOUSING (MID-RISE) (221)			
INDEPENDENT VARIABLE	MAX OF DWELLING UNITS & OCCUPIED DWELLING UNITS			
SIZE	39 DWELLING UNITS & 39 OCCUPIED DWELLING UNITS			
	RATE	TRIPS		
		ENTERING	EXITING	SUM
***SATURDAY* DAILY**				
MINIMUM RATE		83	83	166
AVERAGE RATE		96	95	191
MAXIMUM RATE		166	166	332
STANDARD DEVIATION				
EQUATION		268	268	536
LARGEST OF AVERAGE OR EQUATION		**268**	**268**	**536**
PEAK HOUR GENERATOR				
MINIMUM RATE		7	7	14
AVERAGE RATE		8	9	17
MAXIMUM RATE		14	14	28
STANDARD DEVIATION				
EQUATION		11	12	23
LARGEST OF AVERAGE OR EQUATION		**11**	**12**	**23**
***SUNDAY* DAILY**				
MINIMUM RATE		63	63	126
AVERAGE RATE		80	80	160
MAXIMUM RATE		164	164	328
STANDARD DEVIATION				
EQUATION		NA	NA	0
LARGEST OF AVERAGE OR EQUATION		**80**	**80**	**160**
PEAK HOUR GENERATOR				
MINIMUM RATE		7	4	11
AVERAGE RATE		9	6	15
MAXIMUM RATE		26	16	42
STANDARD DEVIATION				
EQUATION		NA	NA	0
LARGEST OF AVERAGE OR EQUATION		**9**	**6**	**15**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	PROPOSED DEVELOPMENT			
ITE LAND USE CATEGORY AND CODE	MULTIFAMILY HOUSING (MID-RISE) (221)			
INDEPENDENT VARIABLE	DWELLING UNITS			
SIZE	39			
		TRIPS		
		ENTERING	EXITING	TOTAL
***WEEKDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	27			
AVERAGE SIZE	205			
MINIMUM RATE	1.27	25	25	50
AVERAGE RATE	5.44	106	106	212
MAXIMUM RATE	12.50	244	244	488
STANDARD DEVIATION	2.03			
EQUATION: T = 5.45 * (X) - 1.75	R^2 = 0.77	106	105	211
LARGEST OF AVERAGE OR EQUATION		**106**	**106**	**212**
AM PEAK HOUR ADJACENT STREET		26%	74%	
NUMBER OF STUDIES	53			
AVERAGE SIZE	207			
MINIMUM RATE	0.06	1	1	2
AVERAGE RATE	0.36	4	10	14
MAXIMUM RATE	1.61	16	47	63
STANDARD DEVIATION	0.19			
EQUATION: LN (T) = 0.98 * LN(X) - 0.98	R^2 = 0.67	4	10	14
LARGEST OF AVERAGE OR EQUATION		**4**	**10**	**14**
AM PEAK HOUR GENERATOR		27%	73%	
NUMBER OF STUDIES	48			
AVERAGE SIZE	225			
MINIMUM RATE	0.06	1	1	2
AVERAGE RATE	0.32	3	9	12
MAXIMUM RATE	0.77	8	22	30
STANDARD DEVIATION	0.17			
EQUATION: LN (T) = 0.83 * LN(X) - 0.27	R^2 = 0.69	4	12	16
LARGEST OF AVERAGE OR EQUATION		**4**	**12**	**16**
PM PEAK HOUR ADJACENT STREET		61%	39%	
NUMBER OF STUDIES	60			
AVERAGE SIZE	208			
MINIMUM RATE	0.15	4	2	6
AVERAGE RATE	0.44	10	7	17
MAXIMUM RATE	1.11	26	17	43
STANDARD DEVIATION	0.19			
EQUATION: LN (T) = 0.96 * LN(X) - 0.63	R^2 = 0.72	11	7	18
LARGEST OF AVERAGE OR EQUATION		**11**	**7**	**18**
PM PEAK HOUR GENERATOR		60%	40%	
NUMBER OF STUDIES	47			
AVERAGE SIZE	211			
MINIMUM RATE	0.09	2	2	4
AVERAGE RATE	0.41	10	6	16
MAXIMUM RATE	1.26	29	20	49
STANDARD DEVIATION	0.22			
EQUATION: LN (T) = 0.83 * LN(X) - 0.05	R^2 = 0.94	12	8	20
LARGEST OF AVERAGE OR EQUATION		**12**	**8**	**20**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	PROPOSED DEVELOPMENT			
ITE LAND USE CATEGORY AND CODE	MULTIFAMILY HOUSING (MID-RISE) (221)			
INDEPENDENT VARIABLE	DWELLING UNITS			
SIZE	39			
		TRIPS		
	RATE	ENTERING	EXITING	SUM
***SATURDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	6			
AVERAGE SIZE	224			
MINIMUM RATE	4.03	79	78	157
AVERAGE RATE	4.91	96	95	191
MAXIMUM RATE	8.51	166	166	332
STANDARD DEVIATION	1.26			
EQUATION: T = 3.04 * (X) + 417.11	R^2 = 0.73	268	268	536
LARGEST OF AVERAGE OR EQUATION		**268**	**268**	**536**
PEAK HOUR GENERATOR		49%	51%	
NUMBER OF STUDIES	8			
AVERAGE SIZE	264			
MINIMUM RATE	0.34	6	7	13
AVERAGE RATE	0.44	8	9	17
MAXIMUM RATE	0.73	14	14	28
STANDARD DEVIATION	0.08			
EQUATION: T = 0.42 * (X) + 6.73	R^2 = 0.89	11	12	23
LARGEST OF AVERAGE OR EQUATION		**11**	**12**	**23**
***SUNDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	6			
AVERAGE SIZE	224			
MINIMUM RATE	3.06	60	59	119
AVERAGE RATE	4.09	80	80	160
MAXIMUM RATE	8.41	164	164	328
STANDARD DEVIATION	1.48			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**80**	**80**	**160**
PEAK HOUR GENERATOR		62%	38%	
NUMBER OF STUDIES	6			
AVERAGE SIZE	224			
MINIMUM RATE	0.26	6	4	10
AVERAGE RATE	0.39	9	6	15
MAXIMUM RATE	1.07	26	16	42
STANDARD DEVIATION	0.23			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**9**	**6**	**15**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	PROPOSED DEVELOPMENT			
ITE LAND USE CATEGORY AND CODE	MULTIFAMILY HOUSING (MID-RISE) (221)			
INDEPENDENT VARIABLE	OCCUPIED DWELLING UNITS			
SIZE	39			
		TRIPS		
		ENTERING	EXITING	TOTAL
***WEEKDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	4			
AVERAGE SIZE	175			
MINIMUM RATE	2.95	58	57	115
AVERAGE RATE	4.75	93	92	185
MAXIMUM RATE	5.49	107	107	214
STANDARD DEVIATION	1.00			
EQUATION: T = 5.57 * (X) - 143.95	R^2 = 0.97	37	36	73
LARGEST OF AVERAGE OR EQUATION		**93**	**92**	**185**
AM PEAK HOUR ADJACENT STREET		26%	74%	
NUMBER OF STUDIES	7			
AVERAGE SIZE	234			
MINIMUM RATE	0.36	4	10	14
AVERAGE RATE	0.42	4	12	16
MAXIMUM RATE	0.63	7	18	25
STANDARD DEVIATION	0.06			
EQUATION: T = 0.44 * (X) - 4.16	R^2 = 0.97	3	10	13
LARGEST OF AVERAGE OR EQUATION		**4**	**12**	**16**
AM PEAK HOUR GENERATOR		28%	72%	
NUMBER OF STUDIES	6			
AVERAGE SIZE	229			
MINIMUM RATE	0.36	4	10	14
AVERAGE RATE	0.42	4	12	16
MAXIMUM RATE	0.63	7	18	25
STANDARD DEVIATION	0.07			
EQUATION: T = 0.44 * (X) - 4.65	R^2 = 0.97	4	9	13
LARGEST OF AVERAGE OR EQUATION		**4**	**12**	**16**
PM PEAK HOUR ADJACENT STREET		64%	36%	
NUMBER OF STUDIES	7			
AVERAGE SIZE	234			
MINIMUM RATE	0.29	7	4	11
AVERAGE RATE	0.42	10	6	16
MAXIMUM RATE	0.63	16	9	25
STANDARD DEVIATION	0.12			
EQUATION: T = 0.46 * (X) - 8.22	R^2 = 0.82	6	4	10
LARGEST OF AVERAGE OR EQUATION		**10**	**6**	**16**
PM PEAK HOUR GENERATOR		60%	40%	
NUMBER OF STUDIES	6			
AVERAGE SIZE	229			
MINIMUM RATE	0.29	7	4	11
AVERAGE RATE	0.49	11	8	19
MAXIMUM RATE	0.63	15	10	25
STANDARD DEVIATION	0.10			
EQUATION: T = 0.51 * (X) - 5.79	R^2 = 0.92	8	6	14
LARGEST OF AVERAGE OR EQUATION		**11**	**8**	**19**

EPS GROUP

PROJECT	75 ON 2ND			
PARCEL	PROPOSED DEVELOPMENT			
ITE LAND USE CATEGORY AND CODE	MULTIFAMILY HOUSING (MID-RISE) (221)			
INDEPENDENT VARIABLE	OCCUPIED DWELLING UNITS			
SIZE	39			
		TRIPS		
	RATE	ENTERING	EXITING	SUM
***SATURDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	1			
AVERAGE SIZE	222			
MINIMUM RATE	4.25	83	83	166
AVERAGE RATE	4.25	83	83	166
MAXIMUM RATE	4.25	83	83	166
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**83**	**83**	**166**
PEAK HOUR GENERATOR		53%	47%	
NUMBER OF STUDIES	1			
AVERAGE SIZE	222			
MINIMUM RATE	0.36	7	7	14
AVERAGE RATE	0.36	7	7	14
MAXIMUM RATE	0.36	7	7	14
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**7**	**7**	**14**
***SUNDAY* DAILY**		50%	50%	
NUMBER OF STUDIES	1			
AVERAGE SIZE	222			
MINIMUM RATE	3.23	63	63	126
AVERAGE RATE	3.23	63	63	126
MAXIMUM RATE	3.23	63	63	126
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**63**	**63**	**126**
PEAK HOUR GENERATOR		62%	38%	
NUMBER OF STUDIES	1			
AVERAGE SIZE	222			
MINIMUM RATE	0.27	7	4	11
AVERAGE RATE	0.27	7	4	11
MAXIMUM RATE	0.27	7	4	11
STANDARD DEVIATION	NA			
EQUATION: NOT PROVIDED	NA	NA	NA	NA
LARGEST OF AVERAGE OR EQUATION		**7**	**4**	**11**

EPS GROUP

HUNTER

ENGINEERING CIVIL AND SURVEY

Preliminary

Final Water Design Report
For
75 on 2ND
7502 E. 2ND Street
Scottsdale, Arizona

PRELIMINARY Basis of Design Report

- ☐ ACCEPTED
- ☐ ACCEPTED AS NOTED
- ☑ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If accepted; the preliminary approval is granted under the condition that a final basis of design report will also be submitted for city review and approval (typically during the DR or PP case). The final report shall incorporate further water or sewer design and analysis requirements as defined in the city design standards and policy manual and address those items noted in the preliminary review comments (both separate and included herein). The final report shall be submitted and approved prior to the plan review submission.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon DATE 4/2/2019

Address comments below and shown herein:
1) Revise BOD to preliminary , not final
2) preapp showed this taking up 3 lots and 26 condo units, now takes up 4 lots and 39 units + 20,000ft2 of commercial. A sewer BOD may now be required.
3) Describe the development. No information given on commercial property. Are there restaurants?
4) Revise water demand calcs per DS&PM 2018.
5) Not clear how 4-inch alley water line will be abandonded if an existing service is still on it (7526). If abandoned it must be removed (as do any water services). Neither can be abandoned in place. If line remains it must be upsized to 6-inch and the associated service must be checked and updated to 1" type k copper as necessary.

Registered Professional Engineer (Civil) CERTIFICATE NO. 42104 LARRY M. TALBOTT Date Signed 2/13/19 ARIZONA U.S.A
Expires 3/31/2020

January 2019

Prepared by:
Hunter Engineering, Inc.
10450 North 74th Street, Suite 200
Scottsdale, AZ 85258

2-ZN-2019

Preliminary

FINAL WATER DESIGN REPORT
FOR

75 ON 2ND

7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

PREPARED FOR

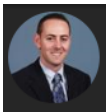
K&I HOMES
6125 EAST INDIAN SCHOOL ROAD, #2005
SCOTTSDALE, AZ 85251

PREPARED BY

HUNTER ENGINEERING, INC.
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
(480) 991-3985

H.E. PROJECT NO. LGEC202

Initial pre-app info provided by LDillon



Wed 9/12/2018 1:44 PM

Dillon, Levi

RE: 690-PA-2018 75 on 2nd

To Cluff, Bryan; Stanek, Scott; Wilson, Doug; Hayes, Eliana; kristjans@kandihomes.com

Cc Acevedo, Alex

All,

I cannot attend this preapp in person but feel free to call X5319 should questions come up. Here is my feedback on the water and sewer for the proposed apartment building:

- A preliminary water basis of design (BOD) report per DS&PM ch6 **will be required**. Note the following:
  - Per DS&PM Ch 6 : Conduct a hydrant flow test, provide new water & sewer utility plan, showing existing buried utilities and address potential conflicts, determine fire flow i.e. hydrant flow used for firefighting, determine adequacy to meet fire flow, refer to Ch. 6 DS&PM for full outline for prelim report requirements.
  - 4" alley water will need to be upsized to 6" DIP as this is City minimum. To avoid this the new apartment could be served off of 2nd Street but 7526 E 2nd Street would still be served off of the 4" alley line. If this service could be relocated to 2nd street this alley line could be abandoned **(unless it needs to be utilized/upsized for a fire hydrant line??)**

- Sewer Basis of design reports **will not be required** (include proposed sewer on utility plan in water BOD).
  - 8" sewer available in alley (slope unknown but contributing properties/basin is small even when considering civic center library peak flows).
  - Similar result for 2nd Street sewer, which could be connected to also.
  - Note:
    - **a new 6" service lateral will be required to service the new apartments per MAG 440-3.**
    - **Sewer proposed in any parking structure may not be permitted and would need to be discussed.**

Feel free to contact me with additional questions.

Thanks,

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

SCOTTSDALE WATER

"Water Sustainability through Stewardship, Innovation and People"

Contact Info

Direct: (480) 312-5319

Main office: (480) 312-5685

Fax: (480) 312-5615

Mailing/Office Address

Water Resources Administration

9379 E. San Salvador Dr.

Scottsdale, AZ. 85258

Sending me an attachment over 5MB? Please use the link below:

https://securemail.scottsdaleaz.gov/dropbox/ldillon@scottsdaleaz.gov

TABLE OF CONTENTS

If any property uses this line along it's length it will need to be upsized to the City 6-inch minimum size and connect to existing 6-inch to the west. To avoid this the new apartment could be served off of 2nd Street but 7526 E 2nd Street would still be served off of the 4" alley line. If this service could be relocated to 2nd street this alley line could be abandoned (unless it needs to be utilized/upsized for a fire hydrant line??)

1.0 INTRODUCTION

This water report has been prepared under a contract from K&I Homes the architect for the 75 On 2nd project. The purpose of this report is to provide a water analysis, as required by the City of Scottsdale, to support this development. This report has been prepared according to the procedures detailed in Chapter 6 of the City of Scottsdale's Design Standards & Policies Manual dated January 2018.

This development project is located at 7502 E. 2nd Street Scottsdale, Arizona 85251. The site is specifically located in The Northwest Quarter of Section 26. Township 2 North, Range 4 East of The Gila And Salt River Base and Meridian. Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

No, unused services must be removed by City staff with the appropriate fee paid by the development (if the line is not abandoned?)

The development is for a proposed 75 on 2nd consisting of approximately 0.81± acres. Improvements to be made on-site include a new building, parking lot, and the construction of landscaped areas. Exhibit A, located in the back pocket, illustrates the proposed improvements for the project.

How will you abandon?, there is another service at 7526 E 2nd Street that utilizes this line.

2.0 EXISTING SITE CONDITIONS

The site is currently developed with existing single-story stucco buildings that were used as single-family residences with parking. The site is bordered by an alley way to the north, 75th street to the west, 2nd street to the south, and small apartment complexes to the east.

There is an existing 4-inch public water main in the alley way directly north of the property that runs parallel to 2nd street. There is also an existing 6-inch public water main in 75th Street and an 8-inch public water main in 2nd Street. There is an existing water service in the alley approximately 50' east of 75th Street and an existing water service off 2nd Street approximately 200' east of 75th Street. Any unused services shall be abandoned at the main.

3.0 EXISTING WATER DISTRIBUTION SYSTEM

Since the 4" main in the alley is too small in diameter this development will bring new domestic and fire services off of 75th Street. The existing service in the alley will be abandoned and the existing service off 2nd Street will be utilized for landscape irrigation.

4.0 PROPOSED DOMESTIC WATER DEMAND

The average day, maximum day and peak hour demands for this development were derived using unit flow requirements out of the City of Scottsdale Design Standards & Policies Manual for Water, Figure 6.1-2. Refer to Appendix D in this report. Average Day Demand (ADD),

need to use gpm values per 2018 DS&PM,
condos=0.27x39x3.5=37gpm ,
commercial =.00111*20000*3.5=77.7gpm

Maximum Day Demand (MDD) and Peak Hour Demand (PHD) for domestic water usage for each building are located in Appendix B. Maximum Day Demand is 2 times the ADD and Peak Hour Demand is 3.5 times the ADD.

Land Use	Building Area or Units sf Units	Average Daily Flows by Land Use Table 6. 1-2 Avg Daily Flows Design Standards Manual For Water and Wastewater Systems		Average Daily Flow (ADF) gpd	Average Daily Flow (ADF) gpm	Maximum Daily Flow (ADF * 2) gpm	Peak Flow (ADF * 3.5) gpm
Comm/Retail	20,002	0.8	gals per s.f.	16,002	11.1	22.2	38.85
Condo	39	185.3	gals per s.f.	7,227	5.0	10	17.5
TOTAL:				**23,228**	**16.1**	**32.2**	**56.4**

5.0 PROPOSED FIRE FLOW DEMAND

The proposed system was modeled using WATERCAD, a pipe network analysis program by Haestad Methods. A reservoir and pump were added to the model near the hydrant flow test location to simulate the pressure versus flow curve. The model has been calibrated to match the results of the hydrant test. Note that the pipe (Model pipes connecting the pump and reservoir are not a part of the system and are oversized to 120-inch to minimize system losses. Pipes and junctions were added to the network model matching the pipe sizes, materials and elevations of the proposed system.

The model is completed as a closed system without extensive information from the entire city pipe network, which is not feasible for the requirements of this report. A closed system is conservative having one-point source of water supply and pressure whereas the existing system can have multiple supply sources feeding the pipe network surrounding the development. The flow test should be representative of the demand adjacent properties have on the system. The hydrant flow test results reflect the time and location of the test. Refer to Appendix C for Fire Flow Test results.

confirm with fire department

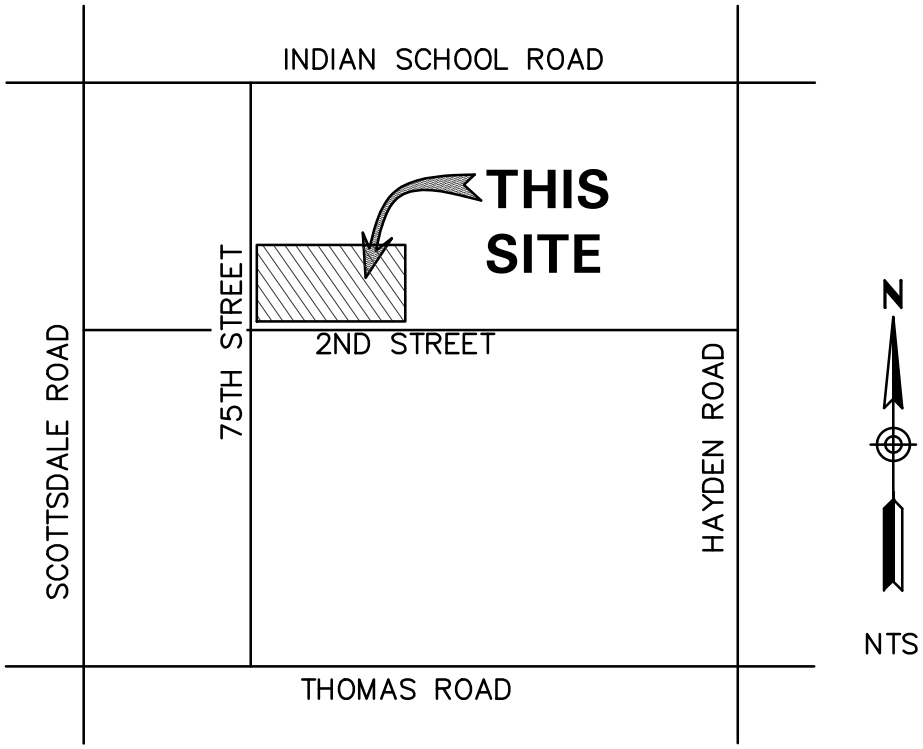
Per the International Fire Code (IFC), the maximum fire flow is based on the construction type of the building and its square footage. The total building area is 70,065 sf. The building type is V-A. This requires a fire flow of 4,750 GPM be achieved at a minimum pressure of 20 PSI. The proposed building will be sprinklered. Therefore, a 50% reduction in the fire flow requirement may be applied. This reduces the required fire flow to 2,375 GPM. The resultant pressure for the fire flow is 62 psi which is more than the minimum required 20 psi. Results from the WaterCAD analysis are summarized below with calculations and detailed results in Appendix B.

6.0 CONCLUSIONS

Based on the results of this study, it can be concluded that:

- The proposed water network meets the requirements to support this development.
- Results of the WaterCAD model indicate that the proposed water network does provide the needed fire flow and pressure to service this development.
- All domestic water lines and firelines shall be privately owned and maintained.

APPENDIX A
FIGURES



VICINITY MAP
FIGURE 1

ALLEY

75TH STREET

2ND STREET

PROPOSED BUILDING
FF=44.25

ABANDON EXIST 1" MTR

ABANDON EXIST 1" MTR

DOM

FDC

FIRE

MTR

BFP

BFP

CONNECT TO EXISTING WATER MAIN

10' R/W

6' PROP SW

6'± EX BC

5'± EX SW

18' R/W

12'± EX SS

9'± EX W

30' R/W

19'± EX BC

10'± EX SD

10'± EX W

5'± EX SS

PROP SEWER

EX BFP

EX MTR

4"W

8"SS VCP

8"W ACP

18"SD

90"SD

6"W CIP

43.62 CPS

43.53 RIM

43.30 CPS

45.38 COR

45.24 COR

45.25 COR

45.10 COR

43.74 INF

81.78 ACF COS

NO.	DATE	REVISION	BY

PURPOSE:
1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
Date Signed 2/6/19
ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR 75 AND 2ND 7502 E. 2ND STREET SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
ARIZONA811 BLUE STAKE, INC. 811
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME:
75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=10'

SHEET:
C3

G:\KAIH013\Const\KAI13CONUTL.dwg, 2/6/2019 8:13:04 AM, talbott

APPENDIX B
CALCULATIONS AND DATA SHEET

Project: 75 on 2nd
Project Number: KAIH013
City: Scottsdale
Date: 1/31/2019

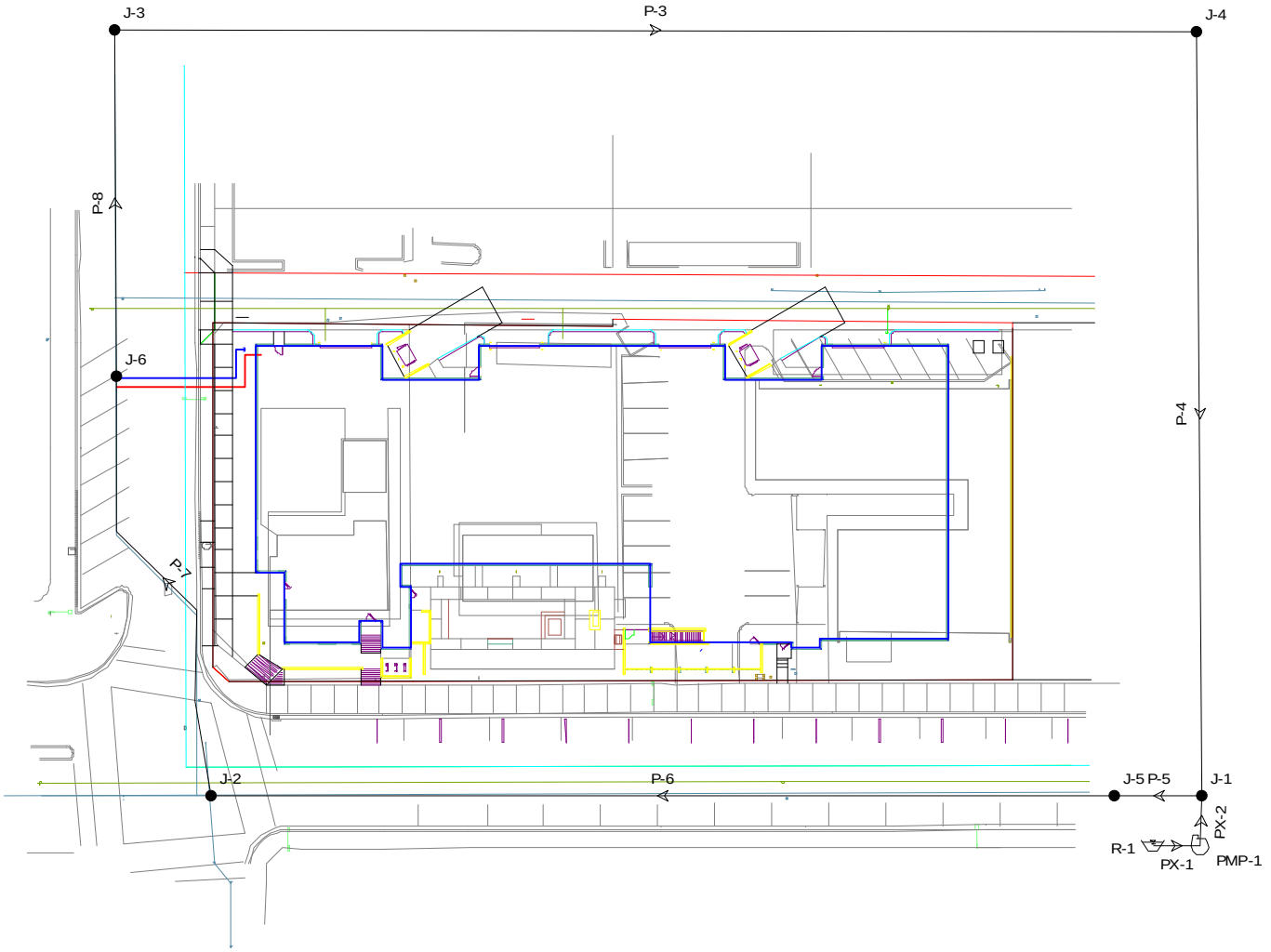
PROJECTED MAXIMUM DOMESTIC WATER DEMANDS

I.D.	Land Use	Building Area or Units sf Units	Average Daily Flows by Land Use Table 6. 1-2 Avg Daily Flows Design Standards Manual For Water and Wastewater Systems		Average Daily Flow (ADF) gpd	Average Daily Flow (ADF) gpm	Maximum Daily Flow (ADF * 2) gpm	Peak Flow (ADF * 3.5) gpm
Building A	**Comm/Retail**	20,002	0.8	gals per s.f.	16,002	11.1	22.2	38.85
	Condo	39	185.3	gals per s.f.	7,227	5.0	10	17.5
	TOTAL:				**23,228**	**16.1**	**32.2**	**56.4**

FIRE FLOW SUMMARY

I.D.	Proposed Building Type	Building Area squate feet	Estimated Construction Type	Minimum Required Fire Flow, Table B105.1 2009 Internation Fire Code	50% Sprinklered Fire Flow	Building Sprinklered
				(gpm)	(gpm)	
Building A	Mixed Use	70,065	V-A	4,750	2,375	YES

Scenario: Hydrant Test 3



Hunter Engineering, Inc

37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Peak
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-3	690.00	6.0	Cast iron	130.0	-21.82	246.83	246.87
P-4	350.00	12.0	Cast iron	130.0	-21.82	246.87	246.87
PX-1	1.00	120.0	Ductile Iron	130.0	56.40	39.00	39.00
PX-2	1.00	120.0	Ductile Iron	130.0	56.40	246.87	246.87
P-5	335.00	8.0	Asphalted cast iron (r	130.0	34.58	246.87	246.86
P-6	340.00	8.0	Asphalted cast iron (r	130.0	34.58	246.86	246.85
P-7	198.00	6.0	Cast iron	130.0	34.58	246.85	246.82
P-8	152.00	6.0	Cast iron	130.0	-21.82	246.82	246.83

Scenario: Peak
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.87	89.94
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.85	89.05
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.83	88.62
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.87	89.50
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.86	89.07
J-6	44.00	Zone	Demand	56.40	Fixed	56.40	246.82	87.75

> 50 psi OK

Scenario: Fire
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	216.84	76.94
J-2	41.03	Zone	Demand	1,000.00	Fixed	1,000.00	190.15	64.52
J-3	42.00	Zone	Demand	1,000.00	Fixed	1,000.00	187.39	62.91
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.34	76.29
J-5	41.00	Zone	Demand	375.00	Fixed	375.00	200.55	69.03
J-6	44.00	Zone	Demand	56.40	Fixed	56.40	188.36	62.46

> 20 psi OK

Scenario: Hydrant Test 1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.95
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.90	89.07
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.90	88.65
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.08
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	246.90	87.79

Matches Hydrant Test OK

Scenario: Hydrant Test 2
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	2,430.00	Fixed	2,430.00	216.87	76.96
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	216.87	76.08
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	216.87	75.66
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.09
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	216.87	74.79

Matches Hydrant Test OK

Scenario: Hydrant Test 3
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	6,031.00	Fixed	6,031.00	85.20	19.99
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	85.20	19.11
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	85.20	18.69
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.56
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.12
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	85.20	17.83

Matches Hydrant Test OK

Detailed Report for Pump: PMP-1

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary				
X	699,451.47	ft	Upstream Pipe	PX-1
Y	906,247.77	ft	Downstream Pipe	PX-2
Elevation	39.00	ft		

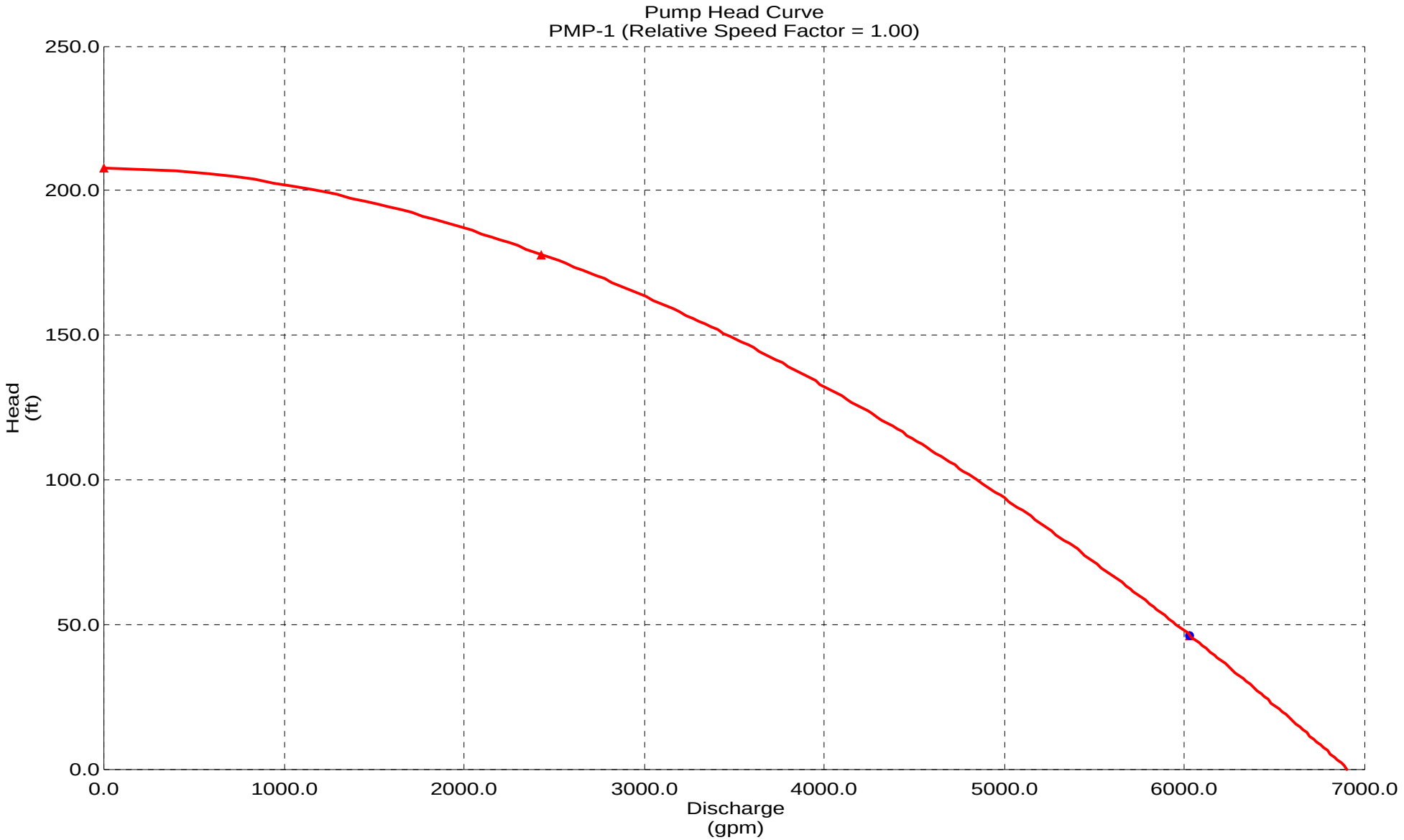
Pump Definition Summary	
Pump Definition	Default Pump Definition

Initial Status			
Initial Pump Status	On	Initial Relative Speed Facto	1.00

Calculated Results Summary

Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0.00	On	39.00	85.20	3,031.00	46.20	1.00	70.35

Detailed Report for Pump: PMP-1



Detailed Report for Reservoir: R-1

Note:
The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	699,435.02 ft	Elevation	39.00 ft
Y	906,248.15 ft	Zone	Zone

Calculated Results Summary

Time (hr)	Calculated Hydraulic Grade (ft)	Inflow (gpm)	Outflow (gpm)
0.00	39.00	3,031.00	,031.00

APPENDIX C
FIRE HYDRANT TEST

SUMMIT FIRE PROTECTION CO.

Phone: (480) 966-9178 Fax: (480) 967-9191 AZ Lic. C-16 275324
2114 East Cedar Street • Tempe, Arizona 85281
E-mail Address: EBeckman@SummitCoUS.com

FIRE HYDRANT FLOW TEST

Name: 75 on 2nd
NEC 75th Street & 2nd Street
Scottsdale, AZ

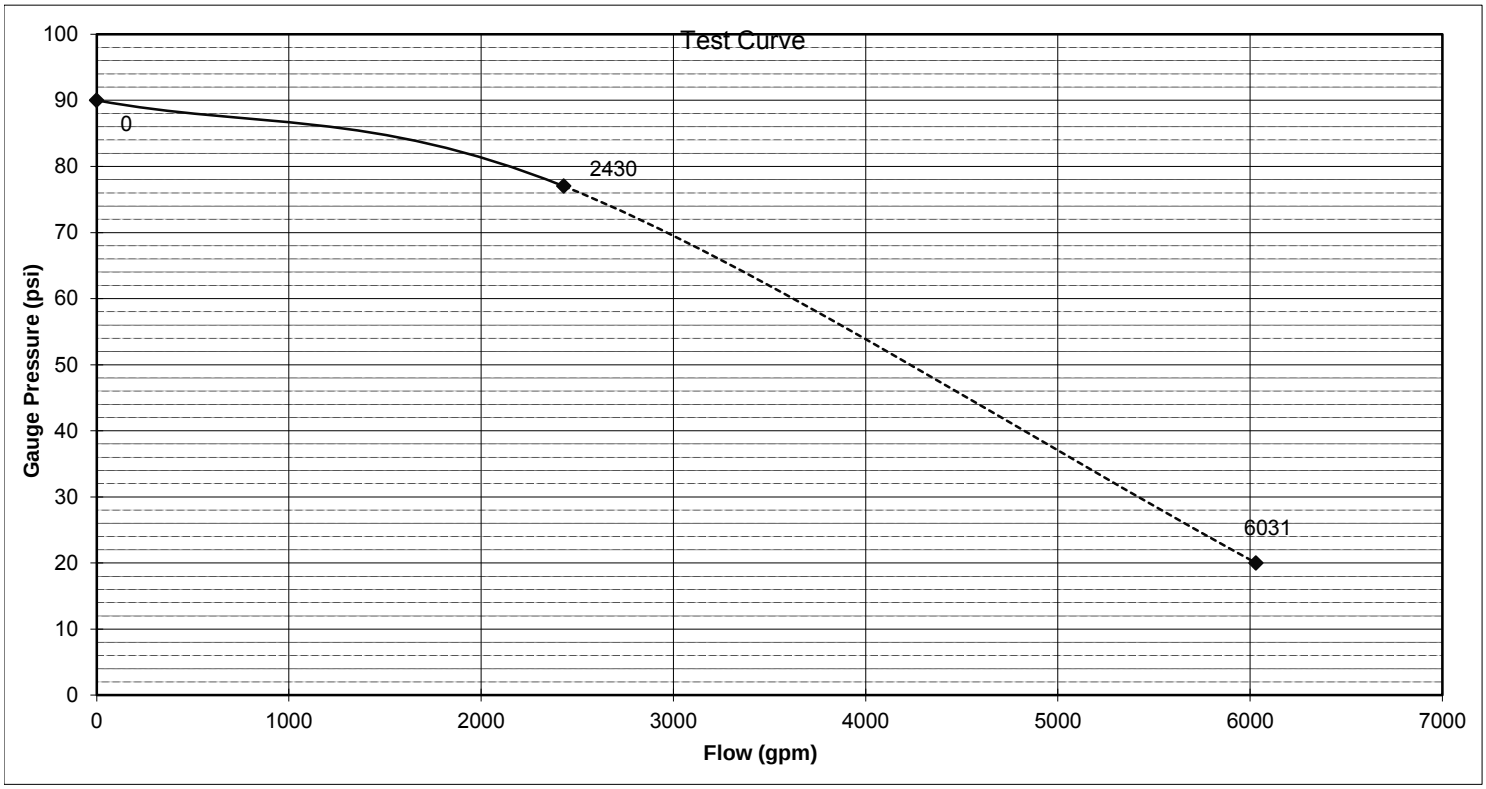
Date: 02/12/19
Time: 7:00 AM
Report #
Tech: Jeff Gauthier

Static Hydrant: SWC of Miller Road and 2nd St.
Flowing Hydrant: SWC of 75th St and 2nd St

Elevation:
Elevation: 0
Dist. Between Hydrants: 500'-0"
Type of Supply: City Main
Diameter of Main:
Static Pressure: 90.0
Residual Pressure: 77.0
Pump Present:
Tank Present:
Req. GPM: Req. PSI:

Hydrant:	1	2	3	4
Outlet Diameter:	4.0			
Pitot Reading:	32.0			
Coeff:	0.900			
Discharge GPM:	2430	0	0	0

Static pressure of	90	psi	@	0	gpm
Residual pressure of	77	psi	@	2430	gpm
Available flow @	20	psi	@	6031	gpm



Comments:

NOTES:

1. Flowing hydrant is assumed to be on a circulating main or downstream of the pressure test hydrant on a dead-end system.
2. Flow analysis assumes a gravity flow system with no distribution pumps and having no demand, other than the test
3. The distance between hydrants, elevations & main diameters are for information only.

APPENDIX D
REFERENCE INFORMATION

CITY OF SCOTTSDALE

DESIGN STANDARDS & POLICIES MANUAL

DESIGN FLOW & HEAD LOSS 6-1.404

The ultimate design flow within the city's water transmission and distribution system will be based on the city's current Integrated Water Master Plan. Water demand for each development will be calculated using the average day demands, as shown in Figure 6-1.2, to ensure that the existing distribution supply is sufficient. Designs will include all necessary improvements, including booster pumping stations, reservoirs, lines and appurtenances to meet the system's ultimate demand.

A. The four hydraulic modeling scenarios detailed in 6-1.202 will demonstrate that the system is adequately designed.
B. Select model scenario flows and their respective peaking factors are as follows:
   1. Maximum day: Defined as 2 times the average day total use flow as determined per Figure 6-1.2 (use gpm value).
   2. Peak hour: Defined as 3.5 times the average day total use as determined per Figure 6-1.2 (use gpm value).
   3. Note: These peaking factors shall be appropriately increased for restaurants and high-demand water users, or as designated by the Water Resources Department after review.
C. The maximum allowable pipe head loss for the various water pipelines is as follows:
   1. Transmission mains: 8 feet per 1,000 feet (3.5 psi per 1,000 feet)
   2. Distribution lines: 10 feet per 1,000 feet (4.3 psi per 1,000 feet)
   3. Service lines – domestic, dedicated fire, or combined domestic/fire: size as required to satisfy both hydraulic modeling requirements and Fire Code. Generally, velocities of more than 5 feet per second are undesirable. Velocities more than 7.5 feet per second are not allowed.
   4. As otherwise designated by the Water Resources Department

SYSTEM FLOW TEST REQUIREMENTS & USE OF RESULTS 6-1.405

Pressure and available flow information for existing water lines must be obtained by having a fire hydrant flow test performed on the system. Hydrant flow tests are required for the following situations:

A. On all commercial projects, multi-family residential projects, and public extensions of the city's water distribution system.
B. For any proposed system connecting to the existing distribution system, the design capacity of the existing system (flow versus pressure) will need to be determined by the engineer.
C. Prior to acceptance by the city, all platted subdivisions shall conduct an additional flow test at the lowest and highest elevation available in which the development is constructed.
D. Developments that cross pressure zone boundaries must conduct a flow test within each pressure zone.

A private fire protection company shall perform the tests and certify the results. A right-of-way permit issued by the One Stop Shop is required for a flow test and the Inspection Services Division will be notified a minimum of 48 hours before performing the flow test. The permit is also available online. Refer to the flow test design form.

d. Pipe flow velocity in feet per second (fps)
e. Each pipe segment's head loss rate (ft. /1,000ft or psi/ft.)
f. PRVs: Upstream and downstream pressures (psi or HGL elevation)
g. Tanks: Inflow and outflow (gpm)
h. Shows all units for the values presented or provide a legend on the diagram page that indicates the units used

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Land Use	Inside Use	Outside Use	Total Use	Inside Use	Outside Use	Total Use	Units
Residential Demand per Dwelling Unit							
< 2 dwelling unit per acre (DU/ac)	208.9	276.7	485.6	0.30	0.39	0.69	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	0.27	0.39	0.66	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	0.25	0.11	0.36	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
12 – 22 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
High Density Condominium (condo)	155.3	30	185.3	0.22	0.05	0.27	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	0.56	0.07	0.63	per room
Service and Employment							
Restaurant	1.2	0.1	1.3	1.67E-03	1.39E-04	1.81E-03	per square foot (sq.ft.)
Commercial/ Retail	0.7	0.1	0.8	9.73E-04	1.39E-04	1.11E-03	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.
Institutional	670	670	1340	0.94	0.94	1.88	per acre
Industrial	873	154	1027	1.22	0.22	1.44	per acre
Research and Development	1092	192	1284	1.52	0.27	1.79	per acre
Special Use Areas							
Natural Area Open Space	0	0	0	0.0	0.0	0.0	per acre
Developed Open Space – Parks	0	1786	1786	0.0	2.49	2.49	per acre
Developed Open Space – Golf Course	0	4285	4285	0.0	5.96	5.96	per acre

Notes:
(1) These values shall not be used directly for service line or water meter sizing.
(2) Gallon per day values are provided for reference only. The instantaneous gallon per minute flow rates presented are intended for use in the required hydraulic modeling scenarios. The gpm values assume a 12-hour active water use period per 24-hour day. In large or specialty developments or master plans the hydraulic analysis criteria and parameters should be discussed with the Water Resources Department. Seasonal peaking should also be considered. Upon review, the Water Resources Department reserves the right to designate flows to be used in hydraulic modeling scenarios that may be different from those presented here.
(3) The hydraulic modeling peaking factors used in select modeling scenarios are to be applied to the gpm values shown here. Max day and peak hour peaking factors can be found in Section 6-1.404.

FIGURE 6-1.2 AVERAGE DAY WATER DEMANDS

TABLE B105.1
MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	

HUNTER
ENGINEERING
CIVIL AND SURVEY

Preliminary Design Report
Sanitary Sewer
For
75 ON 2ND
7502 E. 2ND STREET
Scottsdale, Arizona

PRELIMINARY Basis of Design Report

- ☐ ACCEPTED
- ☑ ACCEPTED AS NOTED
- ☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

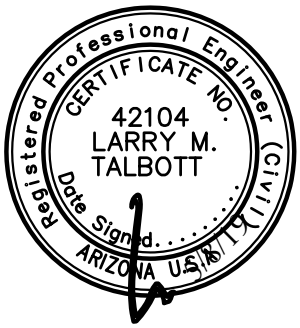
Disclaimer: If accepted; the preliminary approval is granted under the condition that a final basis of design report will also be submitted for city review and approval (typically during the DR or PP case). The final report shall incorporate further water or sewer design and analysis requirements as defined in the city design standards and policy manual and address those items noted in the preliminary review comments (both separate and included herein). The final report shall be submitted and approved prior to the plan review submission.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon **DATE** 6/13/2019

Call out on plans to coordinate existing service line removals/abandonments with City.

MAG 440-3 clean-out needed on sewer service line. Call out on plans.

Case #2-ZN-2019



April 2019

Prepared by:
Hunter Engineering, Inc.
10450 N. 74th Street, Suite 200
Scottsdale, AZ 85258

PRELIMINARY DESIGN REPORT
SANITARY SEWER
FOR

75 ON 2ND

7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

PREPARED FOR

K&I HOMES
6125 EAST INDIAN SCHOOL ROAD, #2005
SCOTTSDALE, AZ 85251

PREPARED BY

HUNTER ENGINEERING, INC.
10450 N. 74th Street, SUITE 200
SCOTTSDALE, AZ 85258
(480) 991-3985

H.E. PROJECT NO.: KAIH013

TABLE OF CONTENTS

1.0 INTRODUCTION

This sewer report has been prepared under a contract from K&I Homes the architect for the 75 On 2nd project. The purpose of this report is to provide a sewer analysis, as required by the City of Scottsdale, to support this development. This report has been prepared according to the procedures detailed in Chapter 7 of the City of Scottsdale's Design Standards & Policies Manual dated January 2010.

This development project is located at 7502 E. 2nd Street Scottsdale, Arizona 85251. The site is specifically located in The Northwest Quarter of Section 26. Township 2 North, Range 4 East of The Gila And Salt River Base and Meridian. Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

The development is for a proposed 75 on 2nd consisting of approximately 0.81± acres. Improvements to be made on-site include a new building, parking lot, and the construction of landscaped areas. Exhibit A, located in the back pocket, illustrates the proposed improvements for the project.

2.0 EXISTING SITE CONDITIONS

The site is currently developed with existing single-story stucco buildings that were used as single-family residences with parking. The site is bordered by an alley way to the north, 75th street to the west, 2nd street to the south, and small apartment complexes to the east.

There is an existing 8-inch public sewer main in the alley way directly north of the property that runs parallel to 2nd street. There are currently existing sanitary sewer service lines off this line for each existing parcel. There is also an existing 8-inch public sewer main on the south side of 2nd Street. No services are extended to the site from this main. There is an existing 96" storm drain located on the north side of 2nd Street. It is likely that this 96" main precludes the extension of useable services from the 2nd Street sewer main to the site.

3.0 PROPOSED SANITARY SEWER SYSTEM

This development proposes to extend a 6" sewer service from the existing manhole located near the northeast corner of the site. The proposed Building A will have an estimated Average Daily Flow of 6,280 GPD and a Peak Hour Flow of 13 GPM. Wastewater flows were calculated in accordance with the City of Scottsdale Design Standards and Policy Manual (Reference 1). A demand of 0.40gpd per square feet was used for the commercial/retail portion of the building with a peaking factor of 3.0. See the demand calculations in Appendix B.

The calculated proposed flow is well below the available flow of 195 gpm for a 6" service at the minimum slope of 1% and a 0.65 d/D ratio.

4.0 CONCLUSIONS

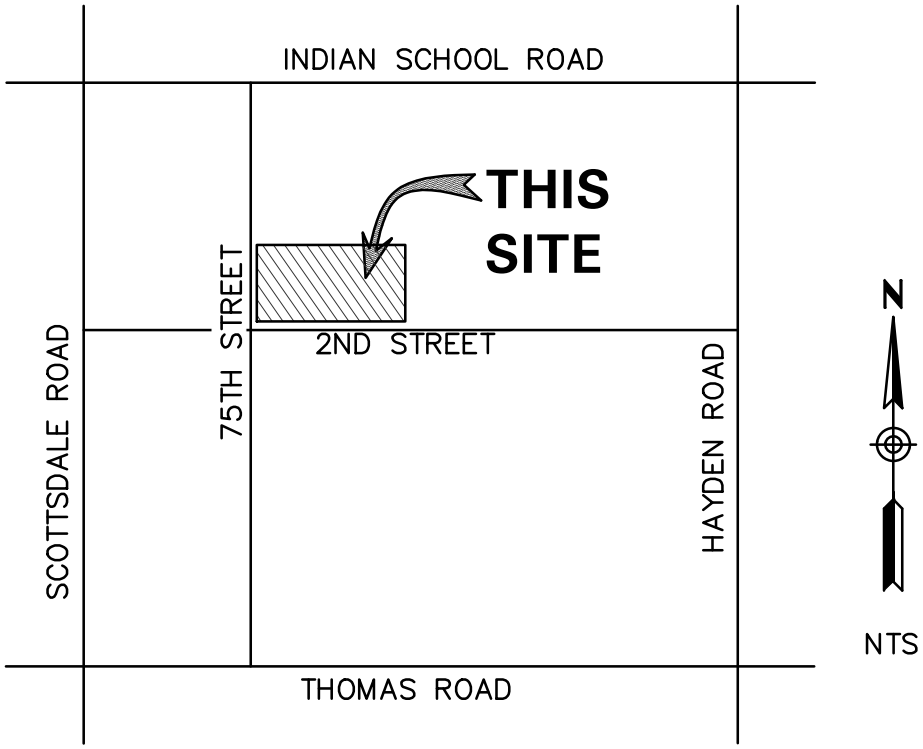
Based on the results of this study, it can be concluded that:

- The proposed sewer system is adequate to service the development.

5.0 REFERENCES

1) *City of Scottsdale Design Standards & Policies Manual*, January 2010.

APPENDIX A
FIGURES



VICINITY MAP
FIGURE 1

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

ABANDON EXIST WATER SERVICE

ABANDON EXIST 4" MAIN IN PLACE

ABANDON EXIST 1" MTR

DOM

FDC

FIRE

MTR

BFP

BFP

CONNECT TO EXISTING WATER MAIN

10' R/W

6' PROP SW

6'± EX BC

5'± EX SW

75TH STREET

ALLEY

18' R/W

12'± EX SS

9'± EX W

PROPOSED BUILDING
FF=44.25

PROP SEWER

ABANDON EXIST 4" MAIN IN PLACE

ABANDON EXIST WATER SERVICE

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

EX 1" METER AND BACKFLOW TO BE USED FOR LANDSCAPE SERVICE

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

30' R/W

19'± EX BC

10'± EX SD

10'± EX W

5'± EX SS

2ND STREET

SCALE 1"=10'

NO.	DATE	REVISION	BY

PURPOSE: 1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
5/9/19
STATE OF ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR 75 AND 2ND 7502 E. 2ND STREET SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
AR ZONA811
BLUE STAKE, INC.
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME:
75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=10'

SHEET:
C3

G:\KAIH013\Drawings\KAIH013CNUTIL.dwg, 5/9/2019 11:22:18 AM, tallbott

APPENDIX B
CALCULATIONS

Project: 75 and 2nd
Project No.: KAIH013
City: SCOTTSDALE, AZ
Date: 1/22/2019

PROJECTED MAXIMUM SANITARY SEWER LOADS

I.D.	Land Use	Building Area or Units sq.ft. / Units	Average Day Sewer Demands in Gallons Figure 7.1-2		Peaking Factor Figure 7.1-2	Average Daily Flow gpd	Average Daily Flow gpm	Peak Flow gpm
Building Area A	**Comm/Retail**	20,002	0.50	per sq.ft.	3	10,001	6.9	20.7
	Condo	39	140.00	per unit	4.5	5,460	3.8	17.1
	Sub-Total					**15,461**	**11**	**38**

Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	6" Service
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data			
Mannings Coeffic	0.013		
Channel Slope	010000	ft/ft	
Depth	0.33	ft	d/D=0.65
Diameter	6.0	in	

Results			
Discharge	195	gpm	>38 gpm OK
Flow Area	0.1	ft²	
Wetted Perime	0.95	ft	
Top Width	0.00	ft	
Critical Depth	0.34	ft	
Percent Full	66.0	%	
Critical Slope	0.009559	ft/ft	
Velocity	3.15	ft/s	
Velocity Head	0.15	ft	
Specific Energ	0.48	ft	
Froude Numbe	1.03		
Maximum Disc	271	gpm	
Discharge Full	252	gpm	
Slope Full	0.005974	ft/ft	
Flow Type	Supercritical		

CITY OF SCOTTSDALE

DESIGN STANDARDS & POLICIES MANUAL

LAND USE	DEMAND (gpd)	DESIGN PEAKING FACTOR
Commercial/Retail	0.5 per sq. ft.	3
Office	0.4 per sq. ft.	3
Restaurant	1.2 per sq. ft.	6
High Density Condominium (Condo)	140 per unit	4.5
Resort Hotel (includes site amenities)	380 per room.	4.5
School: without cafeteria	30 per student	6
School: with cafeteria	50 per student	6
Cultural	0.1 per sq. ft.	3
Clubhouse for Subdivision Golf Course	100 per patron x 2 patrons per du per day	4.5
Fitness Center/ Spa/ Health club	0.8 per sq. ft.	3.5

FIGURE 7-1.2 AVERAGE DAY SEWER DEMAND IN GALLONS PER DAY & PEAKING FACTORS BY LAND USE

HYDRAULIC DESIGN 7-1.404

No public SS lines will be less than 8 inches in diameter unless permission is received in writing from the Water Resources Department.

SS lines shall be designed and constructed to give mean full flow velocities equal to or greater than 2.5 fps, based upon Manning's Formula, using an "n" value of 0.013.

To prevent abrasion and erosion of the pipe material, the maximum velocity will be limited to 10 fps at estimated peak flow. Where velocities exceed this maximum figure, submit a hydraulic analysis along with construction recommendations to the Water Resources Department for consideration. In no case will velocities greater than 15 fps be allowed.

Actual velocities shall be analyzed for minimum, average day and peak day design flow conditions for each reach of pipe.

The SS system shall be designed to achieve uniform flow velocities through consistent slopes. Abrupt changes in slope shall be evaluated for hydraulic jump.

The depth to diameter ratio (d/D) for gravity SS pipes 12 inches in diameter and less shall not exceed 0.65 in the ultimate peak flow condition. This d/D ratio includes an allowance for system infiltration and inflow.

The d/D for gravity drains greater than 12 inches diameter shall not exceed 0.70 for the ultimate peak flow condition. This d/D includes an allowance for system infiltration and inflow.

Measures to mitigate hydrogen sulfide shall be analyzed at manhole drops, abrupt changes in pipe slope or direction and at changes in pipe diameter.

MANHOLES AND CLEAN OUTS 7-1.405

Manholes in city streets shall be located near the center of the inside traffic lane, rather than on or near the line separating traffic lanes. Manholes shall not be in bike trails, equestrian trails, sidewalks, crosswalks or wash crossings. Manholes are required at all

HUNTER
ENGINEERING
CIVIL AND SURVEY

Preliminary Water Design Report
For
75 on 2ND
7502 E. 2ND Street
Scottsdale, Arizona

PRELIMINARY Basis of Design Report

- ☐ ACCEPTED
- ☑ ACCEPTED AS NOTED
- ☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If accepted; the preliminary approval is granted under the condition that a final basis of design report will also be submitted for city review and approval (typically during the DR or PP case). The final report shall incorporate further water or sewer design and analysis requirements as defined in the city design standards and policy manual and address those items noted in the preliminary review comments (both separate and included herein). The final report shall be submitted and approved prior to the plan review submission.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon DATE 6/13/2019

Call out on plans to coordinate existing service line removals/abandonments with City.

Proper abandonment of the 4" water main will be required. Call out on plans.

Case No. 2-ZN-2019

Registered Professional Engineer (Civil)
CERTIFICATE NO.
42104
LARRY M.
TALBOTT
Date Signed 5/8/19
ARIZONA U.S.A

May 2019

Prepared by:
Hunter Engineering, Inc.
10450 North 74th Street, Suite 200
Scottsdale, AZ 85258

PRELIMINARY WATER DESIGN REPORT
FOR

75 ON 2ND

7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

PREPARED FOR

K&I HOMES
6125 EAST INDIAN SCHOOL ROAD, #2005
SCOTTSDALE, AZ 85251

PREPARED BY

HUNTER ENGINEERING, INC.
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
(480) 991-3985

H.E. PROJECT NO. LGEC202

TABLE OF CONTENTS

1.0 INTRODUCTION

This water report has been prepared under a contract from K&I Homes the architect for the 75 On 2nd project. The purpose of this report is to provide a water analysis, as required by the City of Scottsdale, to support this development. This report has been prepared according to the procedures detailed in Chapter 6 of the City of Scottsdale's Design Standards & Policies Manual dated January 2018.

This development project is located at 7502 E. 2nd Street Scottsdale, Arizona 85251. The site is specifically located in The Northwest Quarter of Section 26. Township 2 North, Range 4 East of The Gila And Salt River Base and Meridian. Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

The development is for a proposed 75 on 2nd consisting of approximately 0.81± acres. Improvements to be made on-site include a new apartment building, parking, and the construction of landscaped areas. The proposed apartment building will also include a parking garage, leasing office and gym. Exhibit A, located in the back pocket, illustrates the proposed improvements for the project.

2.0 EXISTING SITE CONDITIONS

The site is currently developed with existing single-story stucco buildings that were used as single-family residences with parking. The site is bordered by an alley way to the north, 75th street to the west, 2nd street to the south, and small apartment complexes to the east.

There is an existing 4-inch public water main in the alley way directly north of the property that runs parallel to 2nd street. There is also an existing 6-inch public water main in 75th Street and an 8-inch public water main in 2nd Street. There is an existing water service to the site in the alley approximately 50' east of 75th Street and an existing water service off 2nd Street approximately 200' east of 75th Street. Any unused services shall be removed by City staff with the appropriate fees paid.

In addition to the project site services off the existing 4" alley water main there is also a service to the adjacent parcel to the east and another across the alley to the northwest that are service from this 4" main. The 4" main does not meet city minimum line size standards.

3.0 EXISTING WATER DISTRIBUTION SYSTEM

Since the 4" main in the alley is too small in diameter this development will bring new domestic and fire services off of 75th Street. The existing 4" main in the alley will be abandoned in place and the existing service off 2nd Street will be utilized for landscape irrigation.

A new service will be provided for the adjacent eastern property from 2nd Street and for the west property north of the alley off 75th Street. Per coordination with Levi Dillon, Sr. Water Resources Engineer, the city will work the developer and the other property owners to help facilitate the new services and line abandonment. See email in Appendix D.

4.0 PROPOSED DOMESTIC WATER DEMAND

The average day, maximum day and peak hour demands for this development were derived using unit flow requirements out of the City of Scottsdale Design Standards & Policies Manual for Water, Figure 6.1-2. Refer to Appendix D in this report. Average Day Demand (ADD), Maximum Day Demand (MDD) and Peak Hour Demand (PHD) for domestic water usage for each building are located in Appendix B. Maximum Day Demand is 2 times the ADD and Peak Hour Demand is 3.5 times the ADD.

Land Use	**Building Area or Units** **sf** **Units**	**Average Daily Flows by Land Use** Table 6. 1-2 Avg Daily Flows Design Standards Manual For Water and Wastewater Systems		**Average Daily Flow (ADF)** **gpd**	**Average Daily Flow (ADF)** **gpm**	**Maximum Daily Flow (ADF * 2)** **gpm**	**Peak Flow (ADF * 3.5)** **gpm**
Comm/Retail	20,002	0.00111	gals per s.f.	31,971	22.2	44.4	77.7
Condo	39	0.27000	gals per s.f.	15,1653	10.5	21.1	36.9
TOTAL:				**47,134**	**32.7**	**65.5**	**114.6**

5.0 PROPOSED FIRE FLOW DEMAND

The proposed system was modeled using WATERCAD, a pipe network analysis program by Haestad Methods. A reservoir and pump were added to the model near the hydrant flow test location to simulate the pressure versus flow curve. The model has been calibrated to match the results of the hydrant test. Note that the pipe (Model pipes connecting the pump and reservoir are not a part of the system and are oversized to 120-inch to minimize system losses. Pipes and junctions were added to the network model matching the pipe sizes, materials and elevations of the proposed system.

The model is completed as a closed system without extensive information from the entire city pipe network, which is not feasible for the requirements of this report. A closed system is conservative having one-point source of water supply and pressure whereas the existing system can have multiple supply sources feeding the pipe network surrounding the development. The flow test should be representative of the demand adjacent properties have on the system. The

hydrant flow test results reflect the time and location of the test. Refer to Appendix C for Fire Flow Test results.

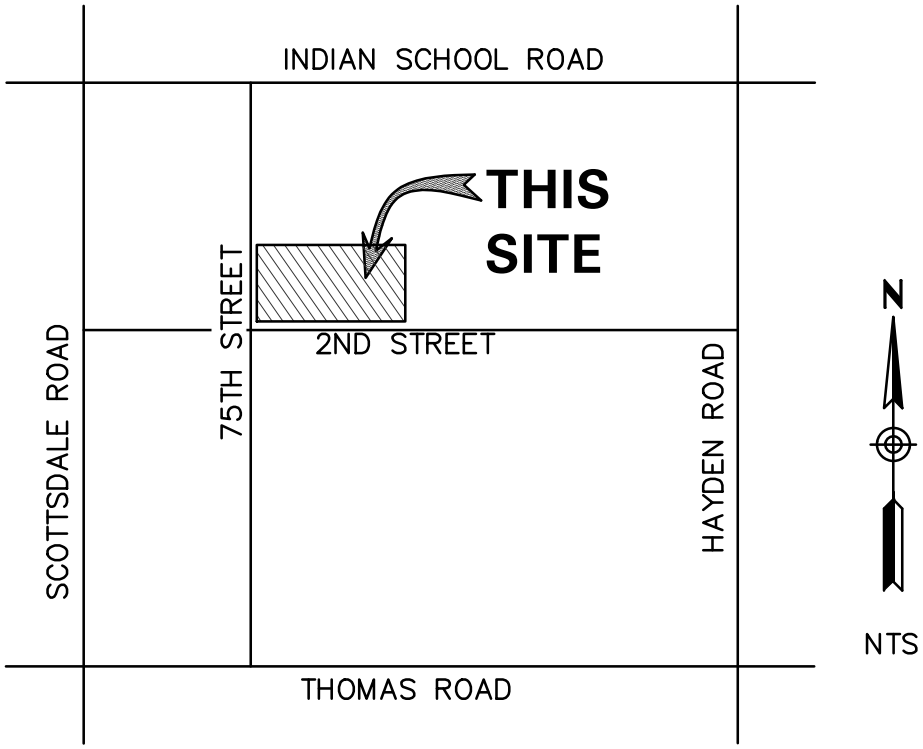
The proposed Occupancy Class is S-2 for the Parking Garage, B for the leasing and gym and R-2 for the Apartments. Per the International Fire Code (IFC), the maximum fire flow is based on the construction type of the building and its square footage. The total building area is 70,065 sf. The building construction type is V-A. This requires a fire flow of 4,750 GPM be achieved at a minimum pressure of 20 PSI. The proposed building will be sprinklered. Therefore, a 50% reduction in the fire flow requirement may be applied. This reduces the required fire flow to 2,375 GPM. The resultant pressure for the fire flow is 62 psi which is more than the minimum required 20 psi. Results from the WaterCAD analysis are summarized below with calculations and detailed results in Appendix B.

6.0 CONCLUSIONS

Based on the results of this study, it can be concluded that:

- The proposed water network meets the requirements to support this development.
- Results of the WaterCAD model indicate that the proposed water network does provide the needed fire flow and pressure to service this development.
- All domestic water lines and firelines shall be privately owned and maintained.

APPENDIX A
FIGURES



VICINITY MAP
FIGURE 1

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

ABANDON EXIST WATER SERVICE

ABANDON EXIST 4" MAIN IN PLACE

Coordinate with City, detail/explain on plans

needs cleanout in City ROW per MAG 440-3

proper abandonment needs to be done and detailed/ called out on plans

ABANDON EXIST 1" MTR

DOM

FDC

FIRE

MTR

BFP

BFP

CONNECT TO EXISTING WATER MAIN

ALLEY

18' R/W

12'± EX SS

9'± EX W

PROP SEWER

ABANDON EXIST WATER SERVICE

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

ABANDON EXIST 4" MAIN IN PLACE

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

PROPOSED BUILDING

FF=44.25

75TH STREET

10' R/W

6'± EX BC

6' PROP SW

5'± EX SW

2ND STREET

30' R/W

19'± EX BC

10'± EX SD

10'± EX W

5'± EX SS

EX 1" METER AND BACKFLOW TO BE USED FOR LANDSCAPE SERVICE

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

SCALE 1"=10'

NO.	DATE	REVISION	BY

PURPOSE: 1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
5/9/19
RENEWAL DATE
ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR 75 AND 2ND 7502 E. 2ND STREET SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
AR ZONA811
BLUE STAKE, INC.
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME: 75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=10'

SHEET: C3

G:\KAIH013\Design\Kai013CONUTL.dwg, 5/9/2019 11:22:18 AM, dallott

APPENDIX B
CALCULATIONS AND DATA SHEET

Project: 75 on 2nd
Project Number: KAIH013
City: Scottsdale
Date: 1/31/2019

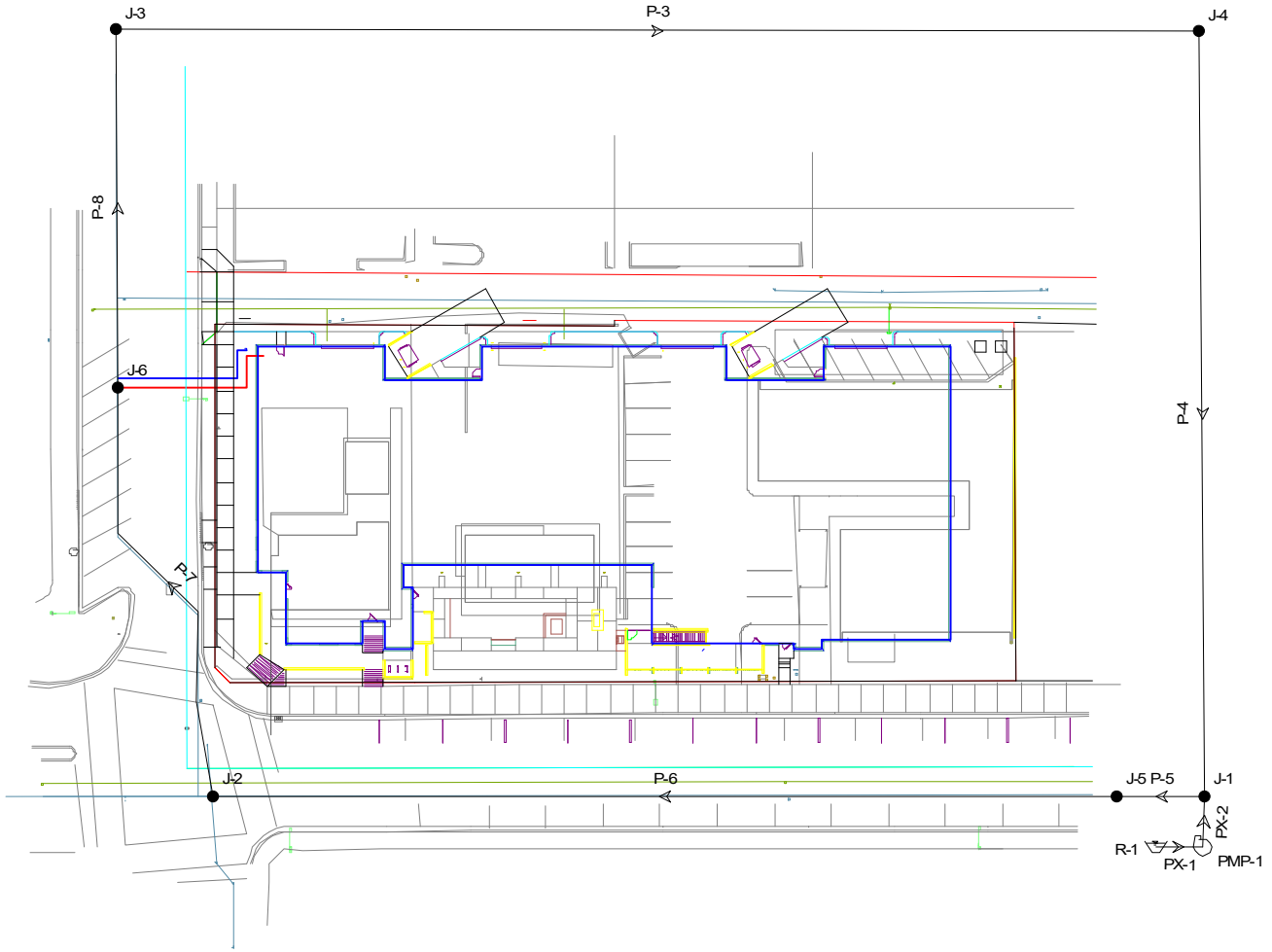
PROJECTED MAXIMUM DOMESTIC WATER DEMANDS

I.D.	Land Use	Building Area or Units sf Unit	Average Daily Flows by Land Use Table 6-1.2 Avg Day Water Dem Design Standards Manual For Water and Wastewater Systems		Average Daily Flow (ADF) gpd	Average Daily Flow (ADF) gpm	Maximum Daily Flow (ADF * 2) gpm	Peak Flow (ADF * 3.5) gpm
Building A	**Mixed Use**	20,002	0.00111	gals per s.f.	31,971	22.2	44.4	77.7
	Condo	39	0.27000	gals per unit	15,163	10.5	21.1	36.9
	TOTAL:				**47,134**	**32.7**	**65.5**	**114.6**

FIRE FLOW SUMMARY

I.D.	Proposed Building Type	Building Area squate feet	Estimated Construction Type	Minimum Required Fire Flow, Table B105.1 2009 Internation Fire Code	50% Sprinklered Fire Flow	Building Sprinklered
				(gpm)	(gpm)	
Building A	Mixed Use	70,065	V-A	4,750	2,375	YES

Scenario: Hydrant Test 3



Hunter Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Peak
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-3	690.00	6.0	Cast iron	130.0	-44.35	246.63	246.79
P-4	350.00	12.0	Cast iron	130.0	-44.35	246.79	246.80
PX-1	1.00	120.0	Ductile Iron	130.0	114.60	39.00	39.00
PX-2	1.00	120.0	Ductile Iron	130.0	114.60	246.80	246.80
P-5	335.00	8.0	Asphalted cast iron (r	130.0	70.25	246.80	246.75
P-6	340.00	8.0	Asphalted cast iron (r	130.0	70.25	246.75	246.70
P-7	198.00	6.0	Cast iron	130.0	70.25	246.70	246.60
P-8	152.00	6.0	Cast iron	130.0	-44.35	246.60	246.63

Scenario: Peak
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.80	89.90
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.70	88.99
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.63	88.53
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.79	89.47
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.75	89.02
J-6	44.00	Zone	Demand	114.60	Fixed	114.60	246.60	87.65

> 50 psi OK

Scenario: Fire
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	216.63	76.85
J-2	41.03	Zone	Demand	1,000.00	Fixed	1,000.00	189.75	64.34
J-3	42.00	Zone	Demand	1,000.00	Fixed	1,000.00	186.95	62.71
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.12	76.20
J-5	41.00	Zone	Demand	375.00	Fixed	375.00	200.24	68.90
J-6	44.00	Zone	Demand	65.50	Fixed	65.50	187.89	62.26

> 20 psi OK

Scenario: Hydrant Test 1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.95
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.90	89.07
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.90	88.65
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.08
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	246.90	87.79

Matches Hydrant Test OK

Scenario: Hydrant Test 2
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	2,430.00	Fixed	2,430.00	216.87	76.96
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	216.87	76.08
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	216.87	75.66
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.09
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	216.87	74.79

Matches Hydrant Test OK

Scenario: Hydrant Test 3
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	6,031.00	Fixed	6,031.00	85.20	19.99
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	85.20	19.11
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	85.20	18.69
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.56
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.12
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	85.20	17.83

Matches Hydrant Test OK

Detailed Report for Pump: PMP-1

Note:
The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary					
X	699,451.47	ft	Upstream Pipe	PX-1	
Y	906,247.77	ft	Downstream Pipe	PX-2	
Elevation	39.00	ft			

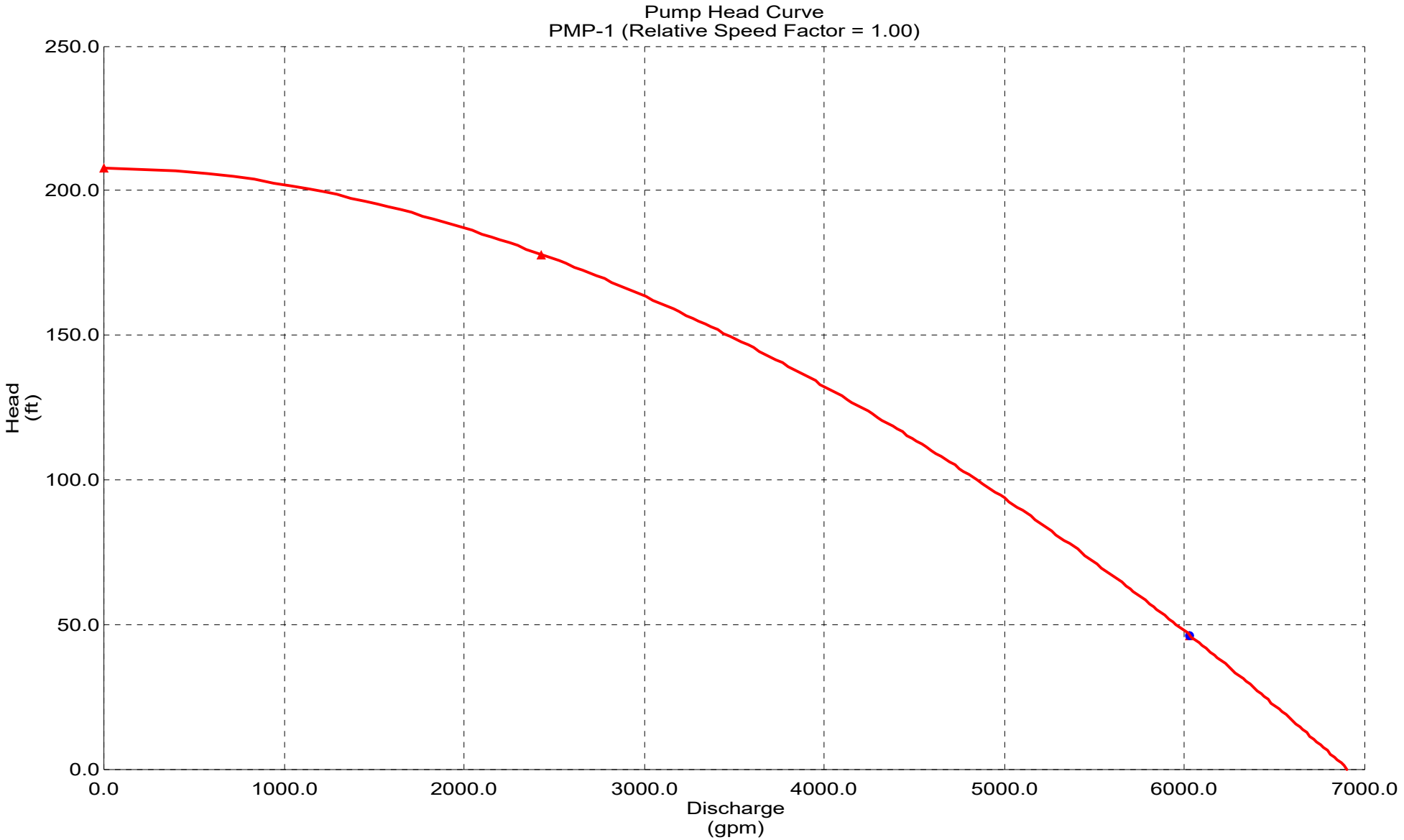
Pump Definition Summary	
Pump Definition	Default Pump Definition

Initial Status			
Initial Pump Status	On	Initial Relative Speed Facto	1.00

Calculated Results Summary

Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0.00	On	39.00	85.20	3,031.00	46.20	1.00	70.35

Detailed Report for Pump: PMP-1



Detailed Report for Reservoir: R-1

Note:
The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	699,435.02 ft	Elevation	39.00 ft
Y	906,248.15 ft	Zone	Zone

Calculated Results Summary

Time (hr)	Calculated Hydraulic Grade (ft)	Inflow (gpm)	Outflow (gpm)
0.00	39.00	3,031.00	,031.00

APPENDIX C
FIRE HYDRANT TEST

SUMMIT FIRE PROTECTION CO.

Phone: (480) 966-9178 Fax: (480) 967-9191 AZ Lic. C-16 275324
2114 East Cedar Street • Tempe, Arizona 85281
E-mail Address: EBeckman@SummitCoUS.com

FIRE HYDRANT FLOW TEST

Name: 75 on 2nd
NEC 75th Street & 2nd Street
Scottsdale, AZ

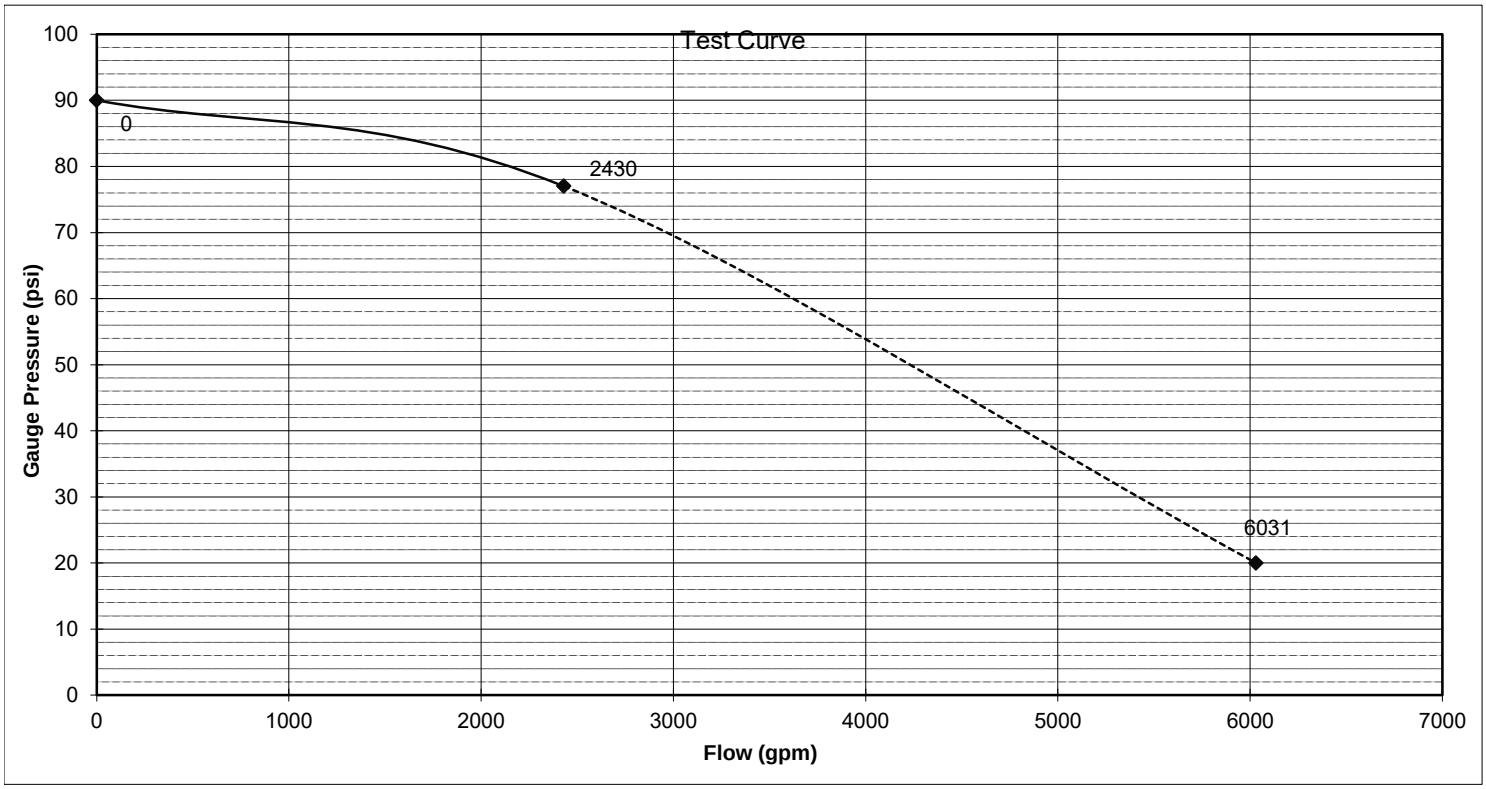
Date: 02/12/19
Time: 7:00 AM
Report #
Tech: Jeff Gauthier

Static Hydrant: SWC of Miller Road and 2nd St.
Flowing Hydrant: SWC of 75th St and 2nd St

Elevation:
Elevation: 0
Dist. Between Hydrants: 500'-0"
Type of Supply: City Main
Diameter of Main:
Static Pressure: 90.0
Residual Pressure: 77.0
Pump Present:
Tank Present:
Req. GPM: Req. PSI:

Hydrant:	1	2	3	4
Outlet Diameter:	4.0			
Pitot Reading:	32.0			
Coeff:	0.900			
Discharge GPM:	2430	0	0	0

Static pressure of	90	psi	@	0	gpm
Residual pressure of	77	psi	@	2430	gpm
Available flow @	20	psi	@	6031	gpm



Comments:

NOTES:

1. Flowing hydrant is assumed to be on a circulating main or downstream of the pressure test hydrant on a dead-end system.
2. Flow analysis assumes a gravity flow system with no distribution pumps and having no demand, other than the test
3. The distance between hydrants, elevations & main diameters are for information only.

APPENDIX D
REFERENCE INFORMATION

Larry Talbott

Subject: FW: 690-PA-2018 75 on 2nd

From: Dillon, Levi <LDillon@Scottsdaleaz.gov>
Sent: Tuesday, May 7, 2019 4:57 PM
To: Kristjan Sigurdsson <kristjans@kandihomes.com>; Larry Talbott <ltalbott@hunterengineeringpc.com>
Subject: RE: 690-PA-2018 75 on 2nd

Hello Larry and Kristjan,

I've discussed all of this with Water Resources' management. Current standards require that a water service be brought directly (perpendicular) from the water main and it cannot cross other private property. This means that your proposal to use the existing landscape meter will not be acceptable. **However**, I think you'll find that the proposal below takes this portion of the work entirely out of the discussion.

Water Resources proposes the following work division for relocating the water services so that the 4" dead-end line can be removed from service:

1. Pending all 4" line service relocations: Water Resources will allow for the 4" line to be properly abandoned in place. 75 on 2nd will be responsible for the abandonment of the portions along their alley frontage.
2. Water Resources will address the tee and valve associated with the 4" water line.
3. Water Resources will take responsibility for providing new water service connections for the two-remaining services on the 4" line up to the property lines.
    a. 7503 E 1st street: Water Resources will install new tap and service line off of 75th Street and connect to the existing meter.
    b. 7526 E 2nd Street: Water Resources will install a tap and service line for from the water main on 2nd street north across the street up to the property line. The City will also set the new meter on the south side of the property (if this location is possible, see item 4).
4. Water Resources requests that 75 on 2nd evaluate and address only the private property segment of the work associated with relocating the water service line/or building supply line for 7526 E 2nd. The City will perform initial coordination with the homeowner to inform them of the need to relocate the service and obtain consent. Following this, 75 on 2nd would need to coordinate with the homeowner and provide the evaluation, design, planning, permitting, and contractor services required to effectively relocate the private property portion of either the building supply line(s) or the service line for 7526 by one of the following methods:
    a. **Method#1**: Running the building supply line from the new City supplied meter on the south side of the property to the alley side of the property and connecting to the existing building supply connection. Note: If it not feasible to place a new meter on the south side then the new service line will need to be routed through private property to the existing or new meter on the north side. OR;
    b. **Method #2:** Running the building supply line from the new meter on the south side through private property and making a new building connection on the property that will ensure water service equivalent to existing. Note: this could involve external landscape irrigation mods and internal plumbing mods.
    c. Notes:
        i. The service line is defined as the line from main to meter
        ii. The building supply line is from meter to building
        iii. The City would need to review and approve either proposed modifications through the typical permit application and review/approval process.

Hopefully with this approach we can effectively achieve compliance with current design standards. Let me know when possible if you and your client agree to proceed as described above.

Thank you,

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

SCOTTSDALE WATER

"Water Sustainability through Stewardship, Innovation and People"

Contact Info
Direct: (480) 312-5319
Main office: (480) 312-5685
Fax: (480) 312-5615
Mailing/Office Address
Water Resources Administration
9379 E. San Salvador Dr.
Scottsdale, AZ. 85258

Sending me an attachment over 5MB? Please use the link below:
https://securemail.scottsdaleaz.gov/dropbox/ldillon@scottsdaleaz.gov

CITY OF SCOTTSDALE

DESIGN STANDARDS & POLICIES MANUAL

DESIGN FLOW & HEAD LOSS 6-1.404

The ultimate design flow within the city's water transmission and distribution system will be based on the city's current Integrated Water Master Plan. Water demand for each development will be calculated using the average day demands, as shown in Figure 6-1.2, to ensure that the existing distribution supply is sufficient. Designs will include all necessary improvements, including booster pumping stations, reservoirs, lines and appurtenances to meet the system's ultimate demand.

A. The four hydraulic modeling scenarios detailed in 6-1.202 will demonstrate that the system is adequately designed.
B. Select model scenario flows and their respective peaking factors are as follows:
   1. Maximum day: Defined as 2 times the average day total use flow as determined per Figure 6-1.2 (use gpm value).
   2. Peak hour: Defined as 3.5 times the average day total use as determined per Figure 6-1.2 (use gpm value).
   3. Note: These peaking factors shall be appropriately increased for restaurants and high-demand water users, or as designated by the Water Resources Department after review.
C. The maximum allowable pipe head loss for the various water pipelines is as follows:
   1. Transmission mains: 8 feet per 1,000 feet (3.5 psi per 1,000 feet)
   2. Distribution lines: 10 feet per 1,000 feet (4.3 psi per 1,000 feet)
   3. Service lines – domestic, dedicated fire, or combined domestic/fire: size as required to satisfy both hydraulic modeling requirements and Fire Code. Generally, velocities of more than 5 feet per second are undesirable. Velocities more than 7.5 feet per second are not allowed.
   4. As otherwise designated by the Water Resources Department

SYSTEM FLOW TEST REQUIREMENTS & USE OF RESULTS 6-1.405

Pressure and available flow information for existing water lines must be obtained by having a fire hydrant flow test performed on the system. Hydrant flow tests are required for the following situations:

A. On all commercial projects, multi-family residential projects, and public extensions of the city's water distribution system.
B. For any proposed system connecting to the existing distribution system, the design capacity of the existing system (flow versus pressure) will need to be determined by the engineer.
C. Prior to acceptance by the city, all platted subdivisions shall conduct an additional flow test at the lowest and highest elevation available in which the development is constructed.
D. Developments that cross pressure zone boundaries must conduct a flow test within each pressure zone.

A private fire protection company shall perform the tests and certify the results. A right-of-way permit issued by the One Stop Shop is required for a flow test and the Inspection Services Division will be notified a minimum of 48 hours before performing the flow test. The permit is also available online. Refer to the flow test design form.

d. Pipe flow velocity in feet per second (fps)
e. Each pipe segment's head loss rate (ft. /1,000ft or psi/ft.)
f. PRVs: Upstream and downstream pressures (psi or HGL elevation)
g. Tanks: Inflow and outflow (gpm)
h. Shows all units for the values presented or provide a legend on the diagram page that indicates the units used

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Land Use	Inside Use	Outside Use	Total Use	Inside Use	Outside Use	Total Use	Units
Residential Demand per Dwelling Unit							
< 2 dwelling unit per acre (DU/ac)	208.9	276.7	485.6	0.30	0.39	0.69	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	0.27	0.39	0.66	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	0.25	0.11	0.36	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
12 – 22 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
High Density Condominium (condo)	155.3	30	185.3	0.22	0.05	0.27	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	0.56	0.07	0.63	per room
Service and Employment							
Restaurant	1.2	0.1	1.3	1.67E-03	1.39E-04	1.81E-03	per square foot (sq.ft.)
Commercial/ Retail	0.7	0.1	0.8	9.73E-04	1.39E-04	1.11E-03	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.
Institutional	670	670	1340	0.94	0.94	1.88	per acre
Industrial	873	154	1027	1.22	0.22	1.44	per acre
Research and Development	1092	192	1284	1.52	0.27	1.79	per acre
Special Use Areas							
Natural Area Open Space	0	0	0	0.0	0.0	0.0	per acre
Developed Open Space – Parks	0	1786	1786	0.0	2.49	2.49	per acre
Developed Open Space – Golf Course	0	4285	4285	0.0	5.96	5.96	per acre

Notes:
(1) These values shall not be used directly for service line or water meter sizing.
(2) Gallon per day values are provided for reference only. The instantaneous gallon per minute flow rates presented are intended for use in the required hydraulic modeling scenarios. The gpm values assume a 12-hour active water use period per 24-hour day. In large or specialty developments or master plans the hydraulic analysis criteria and parameters should be discussed with the Water Resources Department. Seasonal peaking should also be considered. Upon review, the Water Resources Department reserves the right to designate flows to be used in hydraulic modeling scenarios that may be different from those presented here.
(3) The hydraulic modeling peaking factors used in select modeling scenarios are to be applied to the gpm values shown here. Max day and peak hour peaking factors can be found in Section 6-1.404.

FIGURE 6-1.2 AVERAGE DAY WATER DEMANDS

SECTION B101
GENERAL

B101.1 Scope.

The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

SECTION B102
DEFINITIONS

B102.1 Definitions.

For the purpose of this appendix, certain terms are defined as follows:

FIRE FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

FIRE-FLOW CALCULATION AREA. The floor area, in square feet (m^2), used to determine the required fire flow.

SECTION B103
MODIFICATIONS

B103.1 Decreases.

The *fire code official* is authorized to reduce the *fire-flow* requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full *fire-flow* requirements is impractical.

B103.2 Increases.

The *fire code official* is authorized to increase the *fire-flow* requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall be not more than twice that required for the building under consideration.

B103.3 Areas without water supply systems.

For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the *fire code official* is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code*.

SECTION B104
FIRE-FLOW CALCULATION AREA

B104.1 General.

The *fire-flow calculation area* shall be the total floor area of all floor levels within the *exterior walls*, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

B104.2 Area separation.

Portions of buildings that are separated by *fire walls* without openings, constructed in accordance with the *International Building Code*, are allowed to be considered as separate *fire-flow calculation areas*.

B104.3 Type IA and Type IB construction.

The *fire-flow calculation area* of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

Exception: *Fire-flow calculation area* for open parking garages shall be determined by the area of the largest floor.

SECTION B105
FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.

The minimum *fire-flow* and flow duration requirements for one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.1(1) and B105.1(2).

TABLE B105.1(1)
REQUIRED FIRE FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

FIRE-FLOW CALCULATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURAT (hours)
0–3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B at the required fire-
0–3,600	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	500	$^1/_2$
3,601 and greater	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	$^1/_2$ value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m.

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
145,901-	82,101-92,400	52,501-59,100	37,901-42,700	23,301-	4,250	

164,200				26,300		
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	4
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a.Types of construction are based on the *International Building Code*.

b.Measured at 20 psi residual pressure.

B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.

The minimum *fire-flow* and flow duration for buildings other than one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.2 and B105.1(2).

TABLE B105.2
REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the *International Fire Code*	25% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*	25% of the value in Table B105.1(2)[b]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.

a. The reduced fire flow shall be not less than 1,000 gallons per minute.

b. The reduced fire flow shall be not less than 1,500 gallons per minute.

B105.3 Water supply for buildings equipped with an automatic sprinkler system.

For buildings equipped with an *approved automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The *automatic sprinkler system* demand, including hose stream allowance.
2. The required *fire flow*.

SECTION B106
REFERENCED STANDARDS

ICC IBC—18	International Building Code	B104.2
ICC IWUIC—18	International WildlandUrban Interface Code	B103.3
ICC IRC—18	International Residential Code	Table B105.1(1)
NFPA 1142—17	Standard on Water Supplies for Suburban and Rural Fire Fighting	B103.3

HUNTER

ENGINEERING CIVIL AND SURVEY

Final Water Design Report
For
75 on 2ND
7502 E. 2ND Street
Scottsdale, Arizona

January 2019

Prepared by:
Hunter Engineering, Inc.
10450 North 74th Street, Suite 200
Scottsdale, AZ 85258

FINAL WATER DESIGN REPORT
FOR

75 ON 2ND

7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

PREPARED FOR

K&I HOMES
6125 EAST INDIAN SCHOOL ROAD, #2005
SCOTTSDALE, AZ 85251

PREPARED BY

HUNTER ENGINEERING, INC.
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
(480) 991-3985

H.E. PROJECT NO. LGEC202

TABLE OF CONTENTS

1.0 INTRODUCTION

This water report has been prepared under a contract from K&I Homes the architect for the 75 On 2nd project. The purpose of this report is to provide a water analysis, as required by the City of Scottsdale, to support this development. This report has been prepared according to the procedures detailed in Chapter 6 of the City of Scottsdale's Design Standards & Policies Manual dated January 2018.

This development project is located at 7502 E. 2nd Street Scottsdale, Arizona 85251. The site is specifically located in The Northwest Quarter of Section 26. Township 2 North, Range 4 East of The Gila And Salt River Base and Meridian. Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

The development is for a proposed 75 on 2nd consisting of approximately 0.81± acres. Improvements to be made on-site include a new building, parking lot, and the construction of landscaped areas. Exhibit A, located in the back pocket, illustrates the proposed improvements for the project.

2.0 EXISTING SITE CONDITIONS

The site is currently developed with existing single-story stucco buildings that were used as single-family residences with parking. The site is bordered by an alley way to the north, 75th street to the west, 2nd street to the south, and small apartment complexes to the east.

There is an existing 4-inch public water main in the alley way directly north of the property that runs parallel to 2nd street. There is also an existing 6-inch public water main in 75th Street and an 8-inch public water main in 2nd Street. There is an existing water service in the alley approximately 50' east of 75th Street and an existing water service off 2nd Street approximately 200' east of 75th Street. Any unused services shall be abandoned at the main.

3.0 EXISTING WATER DISTRIBUTION SYSTEM

Since the 4" main in the alley is too small in diameter this development will bring new domestic and fire services off of 75th Street. The existing service in the alley will be abandoned and the existing service off 2nd Street will be utilized for landscape irrigation.

4.0 PROPOSED DOMESTIC WATER DEMAND

The average day, maximum day and peak hour demands for this development were derived using unit flow requirements out of the City of Scottsdale Design Standards & Policies Manual for Water, Figure 6.1-2. Refer to Appendix D in this report. Average Day Demand (ADD),

Maximum Day Demand (MDD) and Peak Hour Demand (PHD) for domestic water usage for each building are located in Appendix B. Maximum Day Demand is 2 times the ADD and Peak Hour Demand is 3.5 times the ADD.

Land Use	Building Area or Units sf Units	Average Daily Flows by Land Use Table 6. 1-2 Avg Daily Flows Design Standards Manual For Water and Wastewater Systems		Average Daily Flow (ADF) gpd	Average Daily Flow (ADF) gpm	Maximum Daily Flow (ADF * 2) gpm	Peak Flow (ADF * 3.5) gpm
Comm/Retail	20,002	0.8	gals per s.f.	16,002	11.1	22.2	38.85
Condo	39	185.3	gals per s.f.	7,227	5.0	10	17.5
TOTAL:				**23,228**	**16.1**	**32.2**	**56.4**

5.0 PROPOSED FIRE FLOW DEMAND

The proposed system was modeled using WATERCAD, a pipe network analysis program by Haestad Methods. A reservoir and pump were added to the model near the hydrant flow test location to simulate the pressure versus flow curve. The model has been calibrated to match the results of the hydrant test. Note that the pipe (Model pipes connecting the pump and reservoir are not a part of the system and are oversized to 120-inch to minimize system losses. Pipes and junctions were added to the network model matching the pipe sizes, materials and elevations of the proposed system.

The model is completed as a closed system without extensive information from the entire city pipe network, which is not feasible for the requirements of this report. A closed system is conservative having one-point source of water supply and pressure whereas the existing system can have multiple supply sources feeding the pipe network surrounding the development. The flow test should be representative of the demand adjacent properties have on the system. The hydrant flow test results reflect the time and location of the test. Refer to Appendix C for Fire Flow Test results.

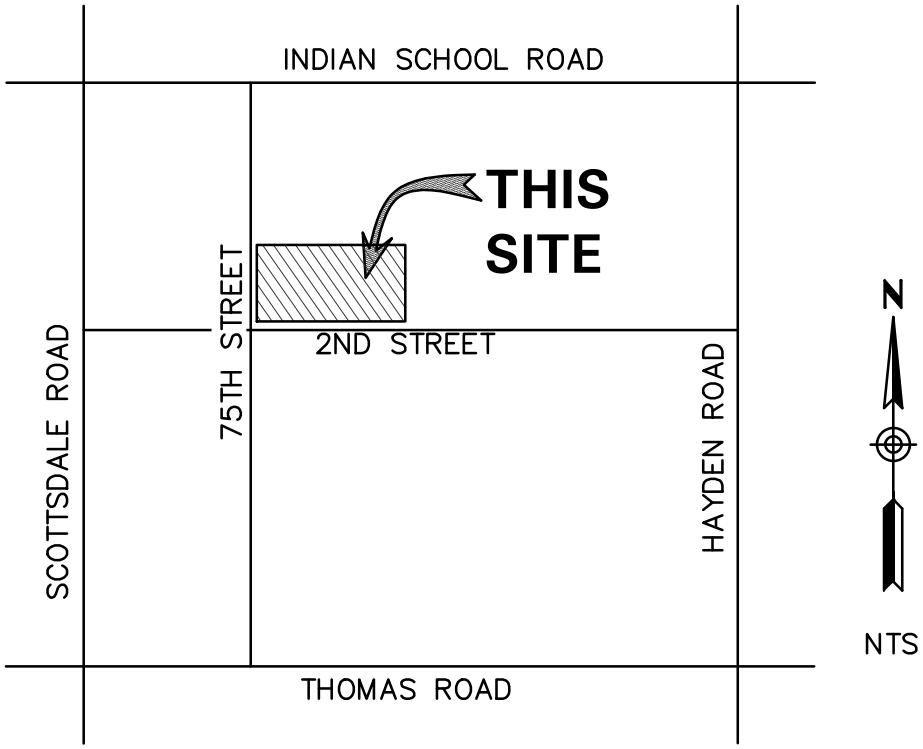
Per the International Fire Code (IFC), the maximum fire flow is based on the construction type of the building and its square footage. The total building area is 70,065 sf. The building type is V-A. This requires a fire flow of 4,750 GPM be achieved at a minimum pressure of 20 PSI. The proposed building will be sprinklered. Therefore, a 50% reduction in the fire flow requirement may be applied. This reduces the required fire flow to 2,375 GPM. The resultant pressure for the fire flow is 62 psi which is more than the minimum required 20 psi. Results from the WaterCAD analysis are summarized below with calculations and detailed results in Appendix B.

6.0 CONCLUSIONS

Based on the results of this study, it can be concluded that:

- The proposed water network meets the requirements to support this development.
- Results of the WaterCAD model indicate that the proposed water network does provide the needed fire flow and pressure to service this development.
- All domestic water lines and firelines shall be privately owned and maintained.

APPENDIX A
FIGURES



VICINITY MAP
FIGURE 1

ALLEY

75TH STREET

2ND STREET

PROPOSED BUILDING
FF=44.25

18' R/W
12'± EX SS
9'± EX W

ABANDON EXIST 1" MTR
ABANDON EXIST 1" MTR
DOM
FDC
FIRE
MTR
BFP
BFP
CONNECT TO EXISTING WATER MAIN
10' R/W
6' PROP SW
6'± EX BC
5'± EX SW
PROP SEWER
EX BFP
EX MTR
30' R/W
19'± EX BC
10'± EX SD
10'± EX W
5'± EX SS

4"W
8"SS VCP
8"W ACP
90"SD
6"W CIP
18"SD

43.62 CPS
45.38 COR
45.24 COR
45.25 COR
45.18 COR
43.53 RIM
43.30 CPS
81.78 ACF COS

NO.	DATE	REVISION	BY

PURPOSE:
1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
Date Signed 2/6/19
ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR 75 AND 2ND 7502 E. 2ND STREET SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
ARIZONA811 BLUE STAKE, INC.
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME:
75 AND 2ND

JOB NO.: KAIH013
SCALE: 1"=10'

SHEET:
C3

3 OF 3

G:\KAIH013\Const\KAIH013CONUTL.dwg, 2/6/2019 8:13:56 AM, talbott

APPENDIX B
CALCULATIONS AND DATA SHEET

Project: 75 on 2nd
Project Number: KAIH013
City: Scottsdale
Date: 1/31/2019

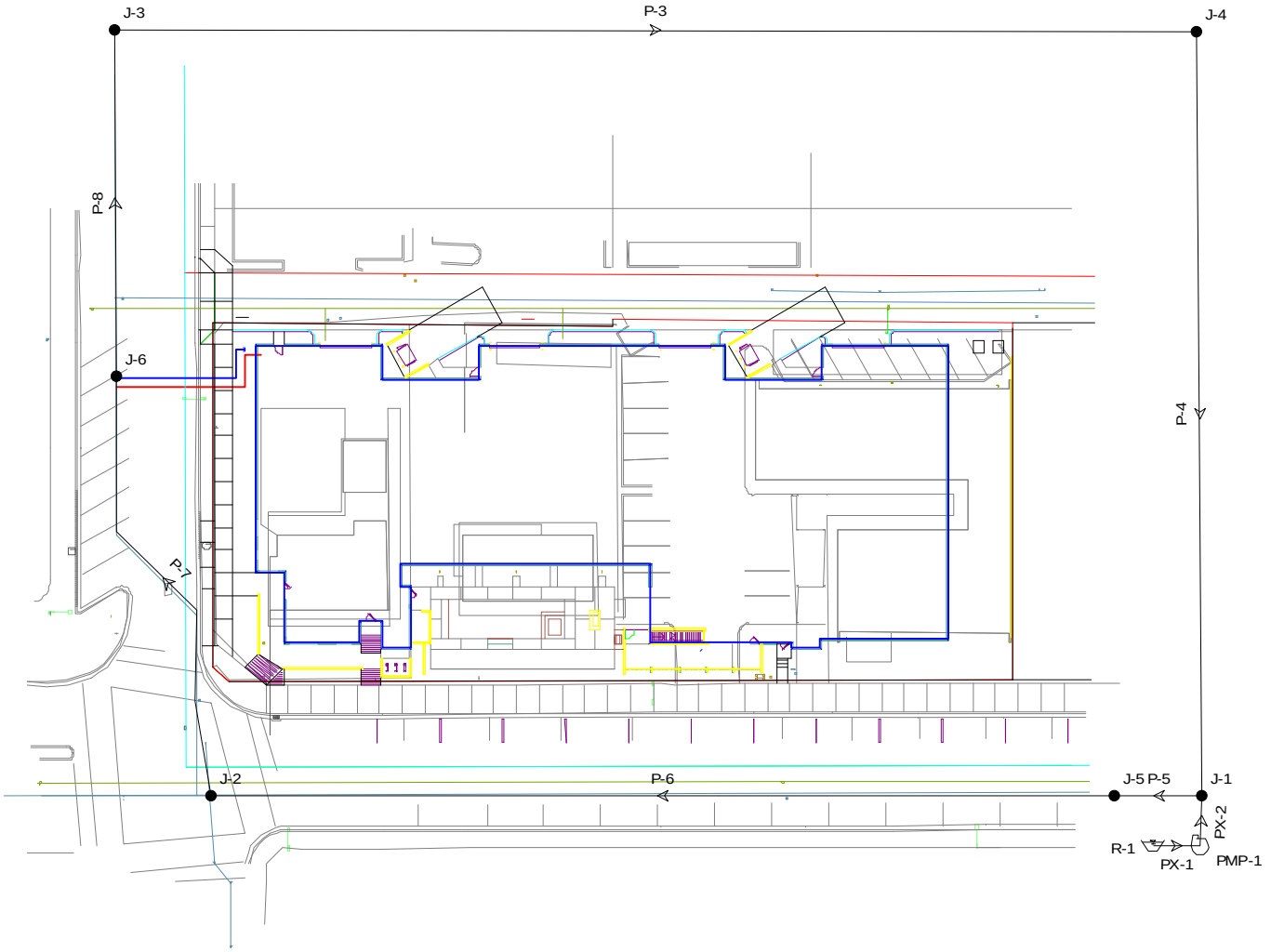
PROJECTED MAXIMUM DOMESTIC WATER DEMANDS

I.D.	Land Use	Building Area or Units sf Units	Average Daily Flows by Land Use Table 6. 1-2 Avg Daily Flows Design Standards Manual For Water and Wastewater Systems		Average Daily Flow (ADF) gpd	Average Daily Flow (ADF) gpm	Maximum Daily Flow (ADF * 2) gpm	Peak Flow (ADF * 3.5) gpm
Building A	**Comm/Retail**	20,002	0.8	gals per s.f.	16,002	11.1	22.2	38.85
	Condo	39	185.3	gals per s.f.	7,227	5.0	10	17.5
	TOTAL:				**23,228**	**16.1**	**32.2**	**56.4**

FIRE FLOW SUMMARY

I.D.	Proposed Building Type	Building Area squate feet	Estimated Construction Type	Minimum Required Fire Flow, Table B105.1 2009 Internation Fire Code	50% Sprinklered Fire Flow	Building Sprinklered
				(gpm)	(gpm)	
Building A	Mixed Use	70,065	V-A	4,750	2,375	YES

Scenario: Hydrant Test 3



Hunter Engineering, Inc

37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Peak
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-3	690.00	6.0	Cast iron	130.0	-21.82	246.83	246.87
P-4	350.00	12.0	Cast iron	130.0	-21.82	246.87	246.87
PX-1	1.00	120.0	Ductile Iron	130.0	56.40	39.00	39.00
PX-2	1.00	120.0	Ductile Iron	130.0	56.40	246.87	246.87
P-5	335.00	8.0	Asphalted cast iron (r	130.0	34.58	246.87	246.86
P-6	340.00	8.0	Asphalted cast iron (r	130.0	34.58	246.86	246.85
P-7	198.00	6.0	Cast iron	130.0	34.58	246.85	246.82
P-8	152.00	6.0	Cast iron	130.0	-21.82	246.82	246.83

Scenario: Peak
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.87	89.94
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.85	89.05
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.83	88.62
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.87	89.50
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.86	89.07
J-6	44.00	Zone	Demand	56.40	Fixed	56.40	246.82	87.75

> 50 psi OK

Scenario: Fire
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	216.84	76.94
J-2	41.03	Zone	Demand	1,000.00	Fixed	1,000.00	190.15	64.52
J-3	42.00	Zone	Demand	1,000.00	Fixed	1,000.00	187.39	62.91
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.34	76.29
J-5	41.00	Zone	Demand	375.00	Fixed	375.00	200.55	69.03
J-6	44.00	Zone	Demand	56.40	Fixed	56.40	188.36	62.46

> 20 psi OK

Scenario: Hydrant Test 1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.95
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.90	89.07
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.90	88.65
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.08
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	246.90	87.79

Matches Hydrant Test OK

Scenario: Hydrant Test 2
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	2,430.00	Fixed	2,430.00	216.87	76.96
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	216.87	76.08
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	216.87	75.66
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.09
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	216.87	74.79

Matches Hydrant Test OK

Scenario: Hydrant Test 3
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	6,031.00	Fixed	6,031.00	85.20	19.99
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	85.20	19.11
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	85.20	18.69
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.56
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.12
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	85.20	17.83

Matches Hydrant Test OK

Detailed Report for Pump: PMP-1

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary				
X	699,451.47	ft	Upstream Pipe	PX-1
Y	906,247.77	ft	Downstream Pipe	PX-2
Elevation	39.00	ft		

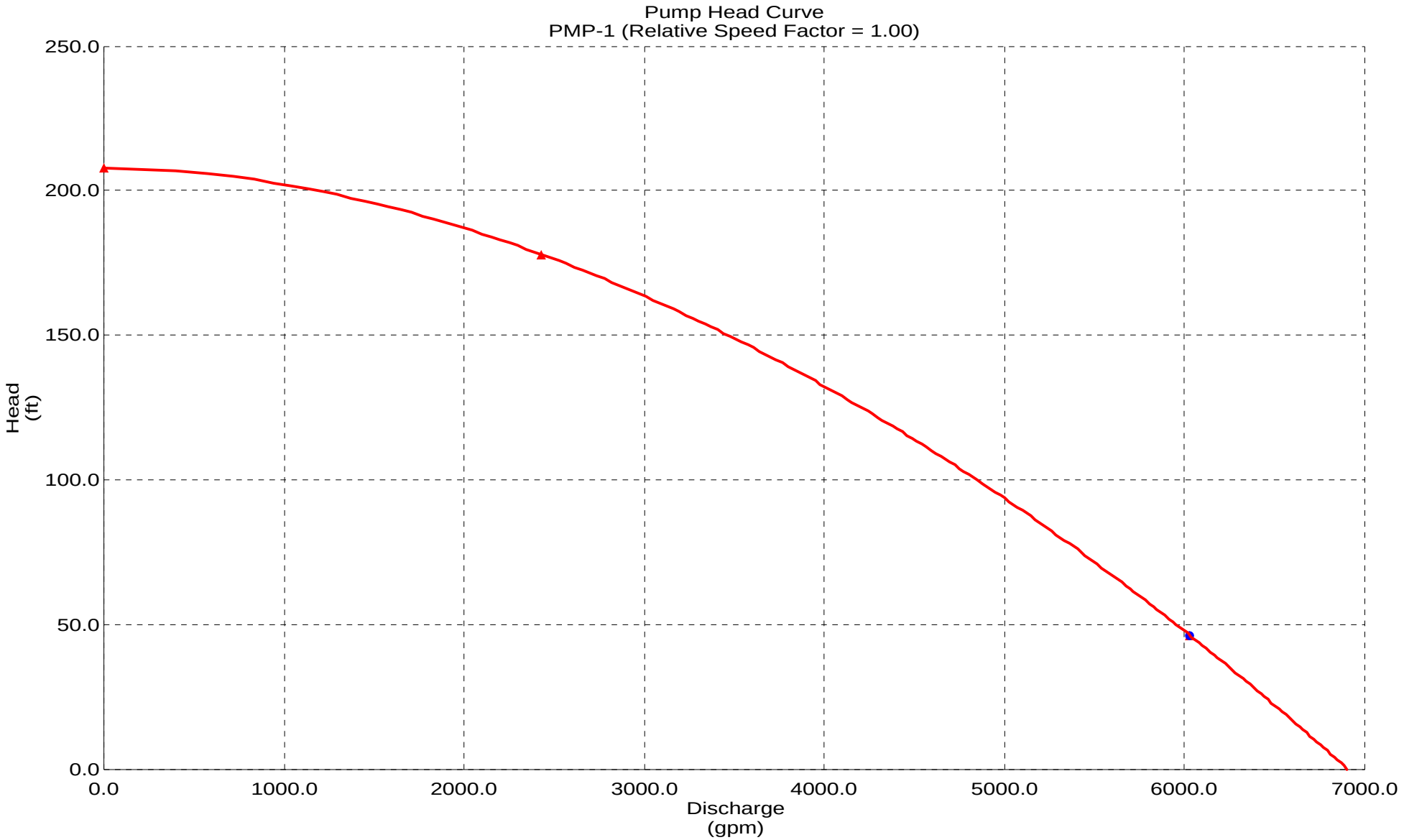
Pump Definition Summary	
Pump Definition	Default Pump Definition

Initial Status			
Initial Pump Status	On	Initial Relative Speed Facto	1.00

Calculated Results Summary

Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0.00	On	39.00	85.20	3,031.00	46.20	1.00	70.35

Detailed Report for Pump: PMP-1



Detailed Report for Reservoir: R-1

Note:
The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	699,435.02 ft	Elevation	39.00 ft
Y	906,248.15 ft	Zone	Zone

Calculated Results Summary

Time (hr)	Calculated Hydraulic Grade (ft)	Inflow (gpm)	Outflow (gpm)
0.00	39.00	3,031.00	,031.00

APPENDIX C
FIRE HYDRANT TEST

SUMMIT FIRE PROTECTION CO.

Phone: (480) 966-9178 Fax: (480) 967-9191 AZ Lic. C-16 275324
2114 East Cedar Street • Tempe, Arizona 85281
E-mail Address: EBeckman@SummitCoUS.com

FIRE HYDRANT FLOW TEST

Name: 75 on 2nd
NEC 75th Street & 2nd Street
Scottsdale, AZ

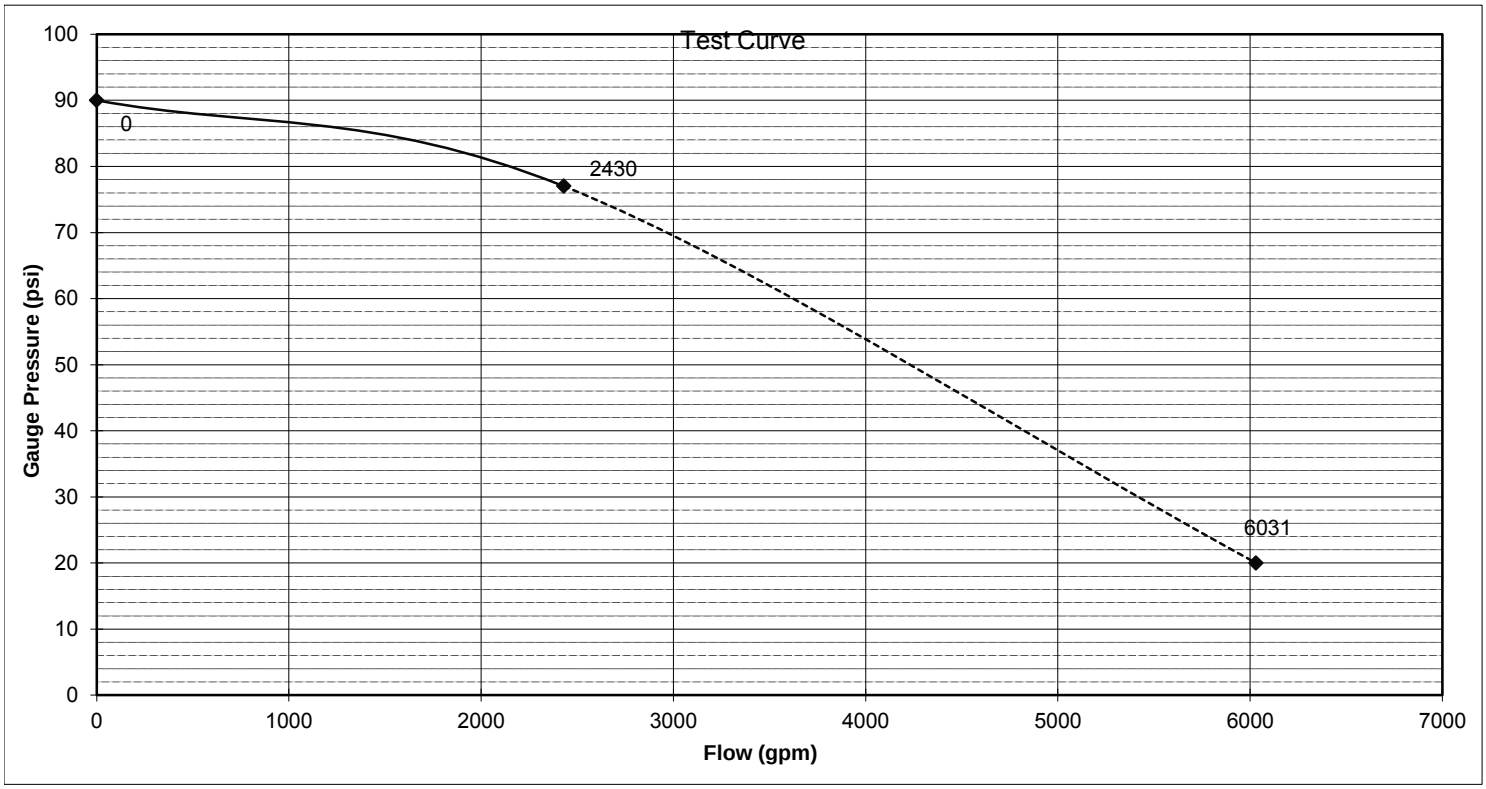
Date: 02/12/19
Time: 7:00 AM
Report #
Tech: Jeff Gauthier

Static Hydrant: SWC of Miller Road and 2nd St.
Flowing Hydrant: SWC of 75th St and 2nd St

Elevation:
Elevation: 0
Dist. Between Hydrants: 500'-0"
Type of Supply: City Main
Diameter of Main:
Static Pressure: 90.0
Residual Pressure: 77.0
Pump Present:
Tank Present:
Req. GPM: Req. PSI:

Hydrant:	1	2	3	4
Outlet Diameter:	4.0			
Pitot Reading:	32.0			
Coeff:	0.900			
Discharge GPM:	2430	0	0	0

Static pressure of	90	psi	@	0	gpm
Residual pressure of	77	psi	@	2430	gpm
Available flow @	20	psi	@	6031	gpm



Comments:

NOTES:

1. Flowing hydrant is assumed to be on a circulating main or downstream of the pressure test hydrant on a dead-end system.
2. Flow analysis assumes a gravity flow system with no distribution pumps and having no demand, other than the test
3. The distance between hydrants, elevations & main diameters are for information only.

APPENDIX D
REFERENCE INFORMATION

CITY OF SCOTTSDALE

DESIGN STANDARDS & POLICIES MANUAL

DESIGN FLOW & HEAD LOSS 6-1.404

The ultimate design flow within the city's water transmission and distribution system will be based on the city's current Integrated Water Master Plan. Water demand for each development will be calculated using the average day demands, as shown in Figure 6-1.2, to ensure that the existing distribution supply is sufficient. Designs will include all necessary improvements, including booster pumping stations, reservoirs, lines and appurtenances to meet the system's ultimate demand.

A. The four hydraulic modeling scenarios detailed in 6-1.202 will demonstrate that the system is adequately designed.
B. Select model scenario flows and their respective peaking factors are as follows:
   1. Maximum day: Defined as 2 times the average day total use flow as determined per Figure 6-1.2 (use gpm value).
   2. Peak hour: Defined as 3.5 times the average day total use as determined per Figure 6-1.2 (use gpm value).
   3. Note: These peaking factors shall be appropriately increased for restaurants and high-demand water users, or as designated by the Water Resources Department after review.
C. The maximum allowable pipe head loss for the various water pipelines is as follows:
   1. Transmission mains: 8 feet per 1,000 feet (3.5 psi per 1,000 feet)
   2. Distribution lines: 10 feet per 1,000 feet (4.3 psi per 1,000 feet)
   3. Service lines – domestic, dedicated fire, or combined domestic/fire: size as required to satisfy both hydraulic modeling requirements and Fire Code. Generally, velocities of more than 5 feet per second are undesirable. Velocities more than 7.5 feet per second are not allowed.
   4. As otherwise designated by the Water Resources Department

SYSTEM FLOW TEST REQUIREMENTS & USE OF RESULTS 6-1.405

Pressure and available flow information for existing water lines must be obtained by having a fire hydrant flow test performed on the system. Hydrant flow tests are required for the following situations:

A. On all commercial projects, multi-family residential projects, and public extensions of the city's water distribution system.
B. For any proposed system connecting to the existing distribution system, the design capacity of the existing system (flow versus pressure) will need to be determined by the engineer.
C. Prior to acceptance by the city, all platted subdivisions shall conduct an additional flow test at the lowest and highest elevation available in which the development is constructed.
D. Developments that cross pressure zone boundaries must conduct a flow test within each pressure zone.

A private fire protection company shall perform the tests and certify the results. A right-of-way permit issued by the One Stop Shop is required for a flow test and the Inspection Services Division will be notified a minimum of 48 hours before performing the flow test. The permit is also available online. Refer to the flow test design form.

d. Pipe flow velocity in feet per second (fps)
e. Each pipe segment's head loss rate (ft. /1,000ft or psi/ft.)
f. PRVs: Upstream and downstream pressures (psi or HGL elevation)
g. Tanks: Inflow and outflow (gpm)
h. Shows all units for the values presented or provide a legend on the diagram page that indicates the units used

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Land Use	Inside Use	Outside Use	Total Use	Inside Use	Outside Use	Total Use	Units
Residential Demand per Dwelling Unit							
< 2 dwelling unit per acre (DU/ac)	208.9	276.7	485.6	0.30	0.39	0.69	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	0.27	0.39	0.66	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	0.25	0.11	0.36	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
12 – 22 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
High Density Condominium (condo)	155.3	30	185.3	0.22	0.05	0.27	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	0.56	0.07	0.63	per room
Service and Employment							
Restaurant	1.2	0.1	1.3	1.67E-03	1.39E-04	1.81E-03	per square foot (sq.ft.)
Commercial/ Retail	0.7	0.1	0.8	9.73E-04	1.39E-04	1.11E-03	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.
Institutional	670	670	1340	0.94	0.94	1.88	per acre
Industrial	873	154	1027	1.22	0.22	1.44	per acre
Research and Development	1092	192	1284	1.52	0.27	1.79	per acre
Special Use Areas							
Natural Area Open Space	0	0	0	0.0	0.0	0.0	per acre
Developed Open Space – Parks	0	1786	1786	0.0	2.49	2.49	per acre
Developed Open Space – Golf Course	0	4285	4285	0.0	5.96	5.96	per acre

Notes:
(1) These values shall not be used directly for service line or water meter sizing.
(2) Gallon per day values are provided for reference only. The instantaneous gallon per minute flow rates presented are intended for use in the required hydraulic modeling scenarios. The gpm values assume a 12-hour active water use period per 24-hour day. In large or specialty developments or master plans the hydraulic analysis criteria and parameters should be discussed with the Water Resources Department. Seasonal peaking should also be considered. Upon review, the Water Resources Department reserves the right to designate flows to be used in hydraulic modeling scenarios that may be different from those presented here.
(3) The hydraulic modeling peaking factors used in select modeling scenarios are to be applied to the gpm values shown here. Max day and peak hour peaking factors can be found in Section 6-1.404.

FIGURE 6-1.2 AVERAGE DAY WATER DEMANDS

TABLE B105.1
MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	

HUNTER

ENGINEERING CIVIL AND SURVEY

PRELIMINARY DRAINAGE REPORT
For
75 ON 2ND
7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

CASE NO. 2-ZN-2019

Prepared by:
Hunter Engineering, P.C.
10450 North 74th Street, #200
Scottsdale, AZ 85258

PRELIMINARY DRAINAGE REPORT
FOR

75 ON 2ND

7502 E. 2ND STREET
SCOTTSDALE, AZ.

PREPARED FOR

K&I HOMES
6125 EAST INDIAN SCHOOL ROAD, #2005
SCOTTSDALE, AZ 85251

PREPARED BY

HUNTER ENGINEERING, P.C.
10450 NORTH 74TH STREET, #200
SCOTTSDALE, AZ 85258
(480) 991-3985

MAY 2019
H.E. PROJECT NO. KAIH013

TABLE OF CONTENTS

1.0 INTRODUCTION

This final drainage report has been prepared under a contract from K&Q Homes, owner/developer of 75 On 2nd site. The purpose of this report is to provide a final drainage analysis, required by the City of Scottsdale, to support this development. Preparation of this report has been done according to the procedures detailed in Chapter 4 of the City of Scottsdale's Design Standard & Policies Manual dated January 2010.

This development project is located at 7502 E. 2ND Street Scottsdale, Arizona 85251.The site is specifically located in The Northwest Quarter Of Section 26. Township 2 North, Range 4 East Of The Gila And Salt River Base And Meridian. Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

The development is for a proposed 75 and 2nd consisting of approximately 0.60± acres. Improvements to be made on-site include a new building, parking lot, and the construction of landscaped areas. Exhibit A, located in the back pocket, illustrates the proposed improvements for the project.

2.0 EXISTING DRAINAGE CONDITIONS

The proposed site is located on a developed parcel with existing ground cover consisting of small buildings, sparse vegetation with shrubs and short grasses. In its developed condition, the project site drains primarily to the south at an average slope of 1%-2%.

The current FEMA Flood Insurance Rate Map (FIRM) for this area, map number 04013C2235 L (Revision date December 7th, 2018) shows the entire project site is in a flood hazard Zone X. Zone X is defined as, "*Area of minimal flood hazard."*

3.0 PROPOSED DRAINAGE CONCEPT

The proposed drainage concept is presented in three parts: on-site drainage conveyance, off-site drainage conveyance, and storm water retention. These three sections make up sections 3.1, 3.2, and 3.3 respectively. Exhibit A, located in the back pocket, provides a graphical illustration of the proposed drainage concept.

3.1 On-site Drainage Conveyance

The proposed onsite drainage improvements for the site will be graded in a way that water will be draining away from the street. Water on the west side of the building will be directed through sheet flow onto 75th street where it will curb flow into an existing curb inlet leading it to and existing 90" storm sewer. Water from the south side of the building will be directed through sheet flow onto 2nd street where it will curb flow into an existing street inlet leading it to and existing 90" storm sewer. The north side of the building will sheet flow water way from the building into an existing alley way gutter where the water will be conveyed into a proposed two-foot-deep retention basin located within landscape area on the east side of the building. On the east side of the building water will be conveyed through sheet flow into the proposed two-foot-deep retention basin. Not catch basins, storm drain piping or underground retention are proposed for this site.

3.2 Off-site Drainage Conveyance

There are not currently any off-site drainage impacts to this site

3.3 Storm Water Retention

The City of Scottsdale requires retention for the Pre versus Post development runoff for the 100-year, 2-hour storm event. The disturbed area is less than 1 acre therefore no first flush is required.

To calculate Pre versus Post required retention, a weighted C-value was calculated for existing and proposed conditions. A weighted drainage area was determined, and volume required for the 100-year, 2-hour storm was calculated. See Below.

Total Site Area= 0.81 acres

C= Runoff Coefficient
C= 0.95 Hardscape area (pavement, building, sidewalk)
C= 0.45 landscape area
Delta C= increase in weighted runoff
P= 2.2 precipitation depth (inches)
HA= hardscape area (pavement, building, sidewalk)
LA= landscape area
Vr= required retention volume (CF) =Delta C*P/12*A

<u>Pre-Development Weighted C</u>

HA=0.4495 AC LA=0.3578AC
C(weighted) = ((0.95)*(0.4495)+(0.45)*(0.3578))/(0.8071)=0.7284

Post-Development Weighted C

HA=0.6656 AC LA=0.1444 AC

C(weighted) = ((0.95)*(0.6656)+(0.45)*(0.1444))/(0.8071)=0.8609

Delta C= 0.8609-0.7284=0.1325

Required Retention Volume (Vr)= 0.1325*2.2/12*0.8071 AC=854 (cf)

The volume requirement of 854 cubif-feet will be satisfied by a single on-site surface retention basin. The basin will be bled-off in the required 36 hours via a gravity bleed-off pipe through an orifice to the existing public storm drain in 2nd Street.

The 100-year high water surface elevation for the retention basin is going to be set at 1042.00, which is 2.25 lower than the adjacent proposed building finished floor which is set at 1044.25.

The proposed outfall for this site is set at 1042.17 located at the south east corner of the property flowing onto 2nd street. The outfall elevation is below the 14" minimum elevation difference than the proposed finished floor of 1044.25.

4.0 CONCLUSIONS

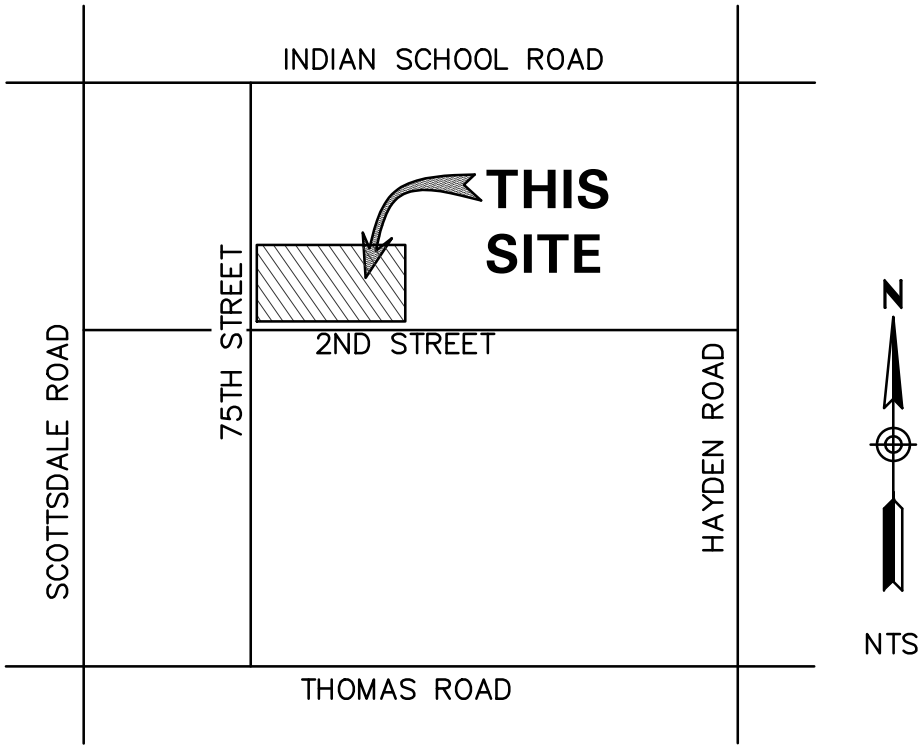
Based on the results of this study, it can be concluded that:

- The site will retain the Pre versus Post run-off for the 100-year, 2-hour storm event.
- The proposed finished floor elevation is a minimum of 14" feet above the 100-year water surface elevation in the proposed retention basin.

5.0 REFERENCES

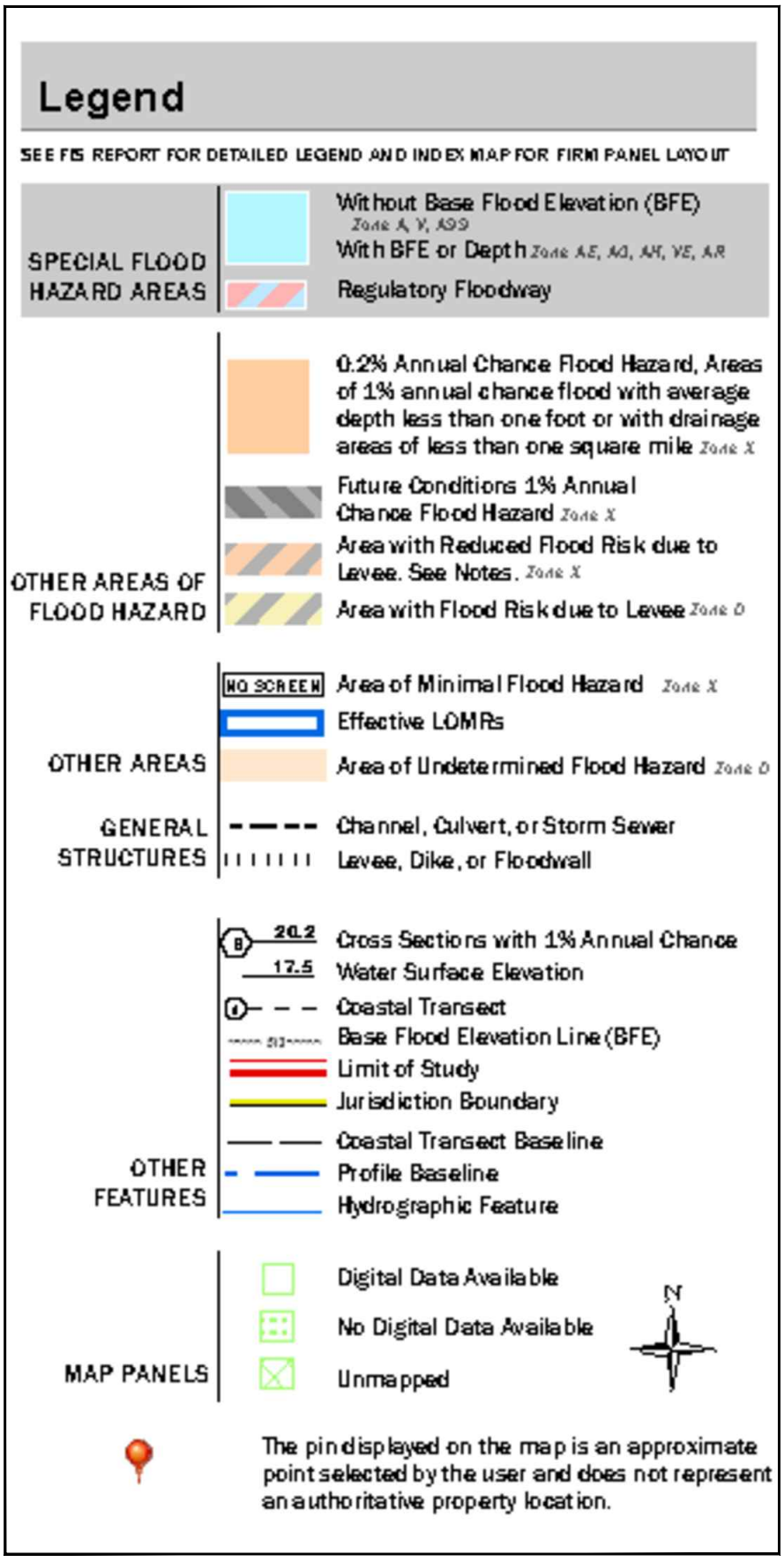
1) City of Scottsdale Standards and Policies manual, February 7 ,2010.
2) Drainage Design Manual for Maricopa County, Arizona, Hydrology, February 2011.
3) Drainage Design Manual for Maricopa County, Arizona, Hydraulics, June 2010.

APPENDIX A
FIGURES

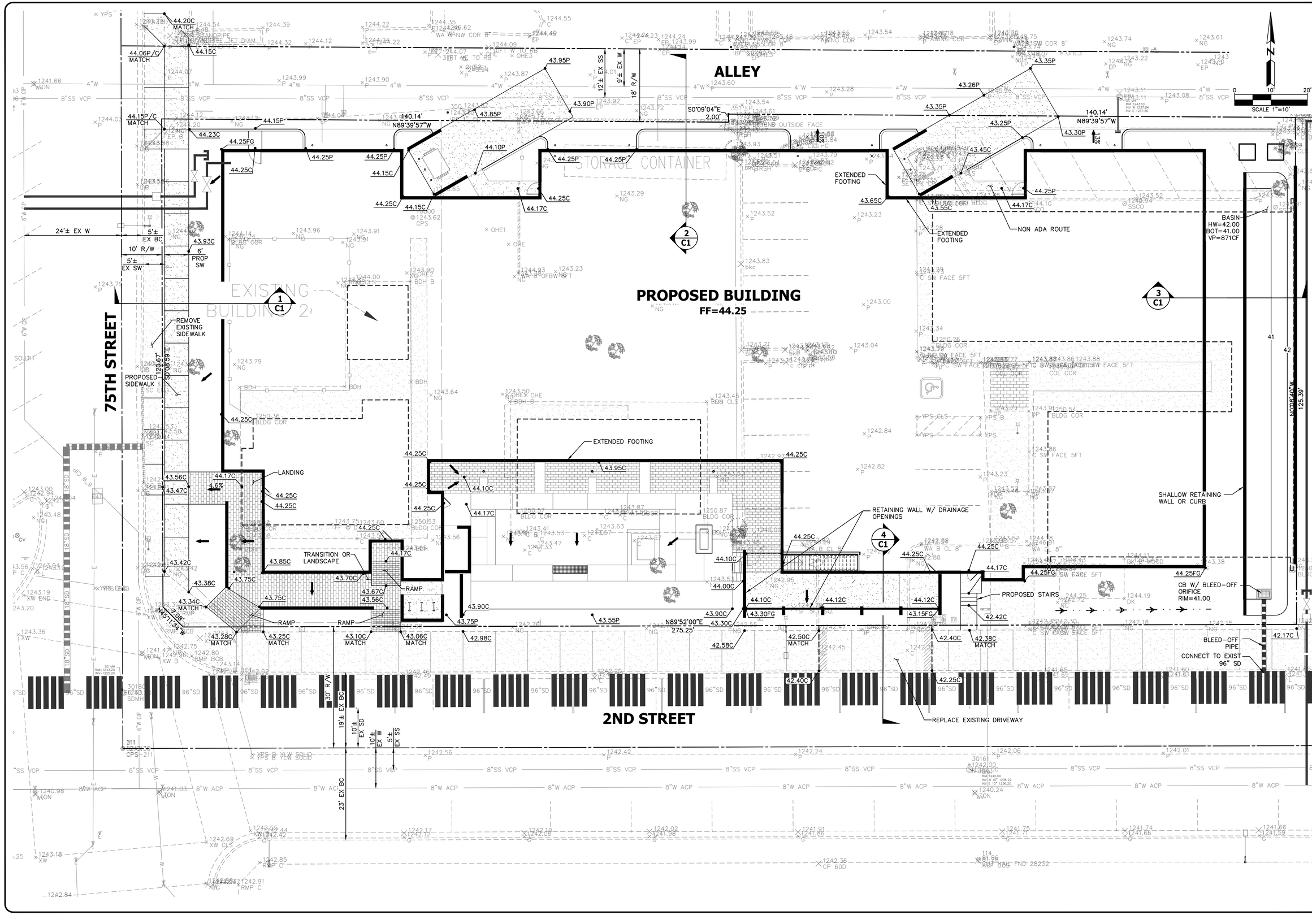


VICINITY MAP
FIGURE 1

PORTION OF PANEL SHOWING SITE
FIGURE 2


Legend
SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE) Zone A, V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD
0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
Future Conditions 1% Annual Chance Flood Hazard Zone X
Area with Reduced Flood Risk due to Levee. See Notes. Zone X
Area with Flood Risk due to Levee Zone D
OTHER AREAS
NO SCREEN
Area of Minimal Flood Hazard Zone X
Effective LOMRs
Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES
Channel, Culvert, or Storm Sewer
Levee, Dike, or Floodwall
OTHER FEATURES
20.2
17.5
Cross Sections with 1% Annual Chance
Water Surface Elevation
Coastal Transect
Base Flood Elevation Line (BFE)
Limit of Study
Jurisdiction Boundary
Coastal Transect Baseline
Profile Baseline
Hydrographic Feature
MAP PANELS
Digital Data Available
No Digital Data Available
Unmapped
N
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

MAP LEGEND



NO.	DATE	REVISION	BY

PURPOSE: 1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
5/9/19
STATE OF ARIZONA U.S.A.

CONCEPTUAL GRADING AND DRAINAGE PLAN FOR 75 AND 2ND
7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
AR ZONA811
CALL 811 OR CLICK ARIZONA811.COM

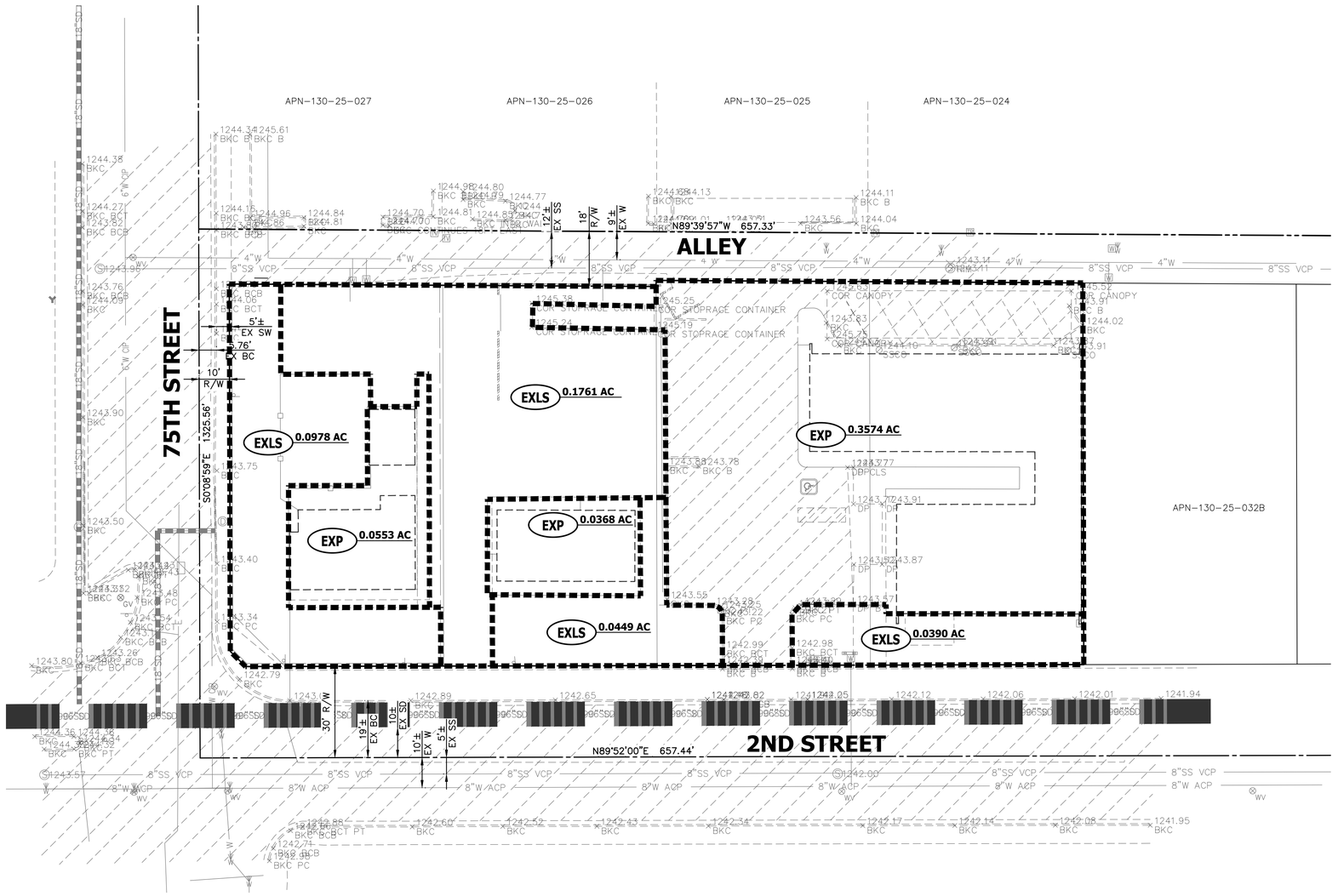
THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

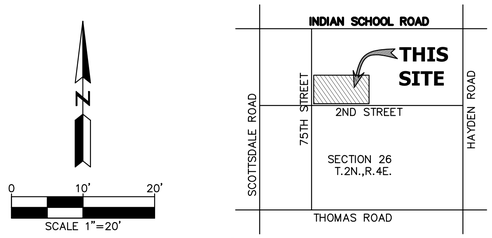
PROJECT NAME: 75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=10'

SHEET: C2

DRAINAGE EXHIBIT 'A'
EXISTING CONDITIONS
FOR
75 AND 2ND
7502 E. 2ND STREET
SCOTTSDALE, ARIZONA





VICINITY MAP

0 10' 20'
SCALE 1"=20'

OWNER

K&I HOMES
6125 EAST INDIAN SCHOOL ROAD #2005
SCOTTSDALE, AZ 85251
PHONE:(602) 505-2525
CONTACT: MR. KRISTJAN SIGURDSSON
EMAIL: KRISTJANS@KANDIHOMES.COM

CIVIL ENGINEER

HUNTER ENGINEERING, INC.
10450 N. 74TH STREET, SUITE #200
SCOTTSDALE, ARIZONA 85258
PHONE: (480) 991-3985
CONTACT: LARRY TALBOTT, P.E
EMAIL: LTALBOTT@HUNTERENGINEERINGPC.COM

LEGEND

43	PROPOSED CONTOUR
	PROPOSED STORM LINE
	PROPOSED CATCH BASIN
	PROPOSED FLOW LINE
	PROPOSED GRADE BREAK
	PROPOSED FLOW ARROW
	DRAINAGE AREA BOUNDARY
EXLS 0.000AC	EXISTING LANDSCAPE
EXP 0.000AC	EXISTING PAVEMENT, CONCRETE OR ROOF AREA

NO.	DATE	REVISION	BY

PURPOSE: 1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
5/9/19
STATE OF ARIZONA U.S.A.

DRAINAGE EXHIBIT 'A' EXISTING CONDITION
FOR
75 AND 2ND
7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
ARIZONA811 BLUE STAKE, INC.
CALL 811 OR CLICK ARIZONA811.COM

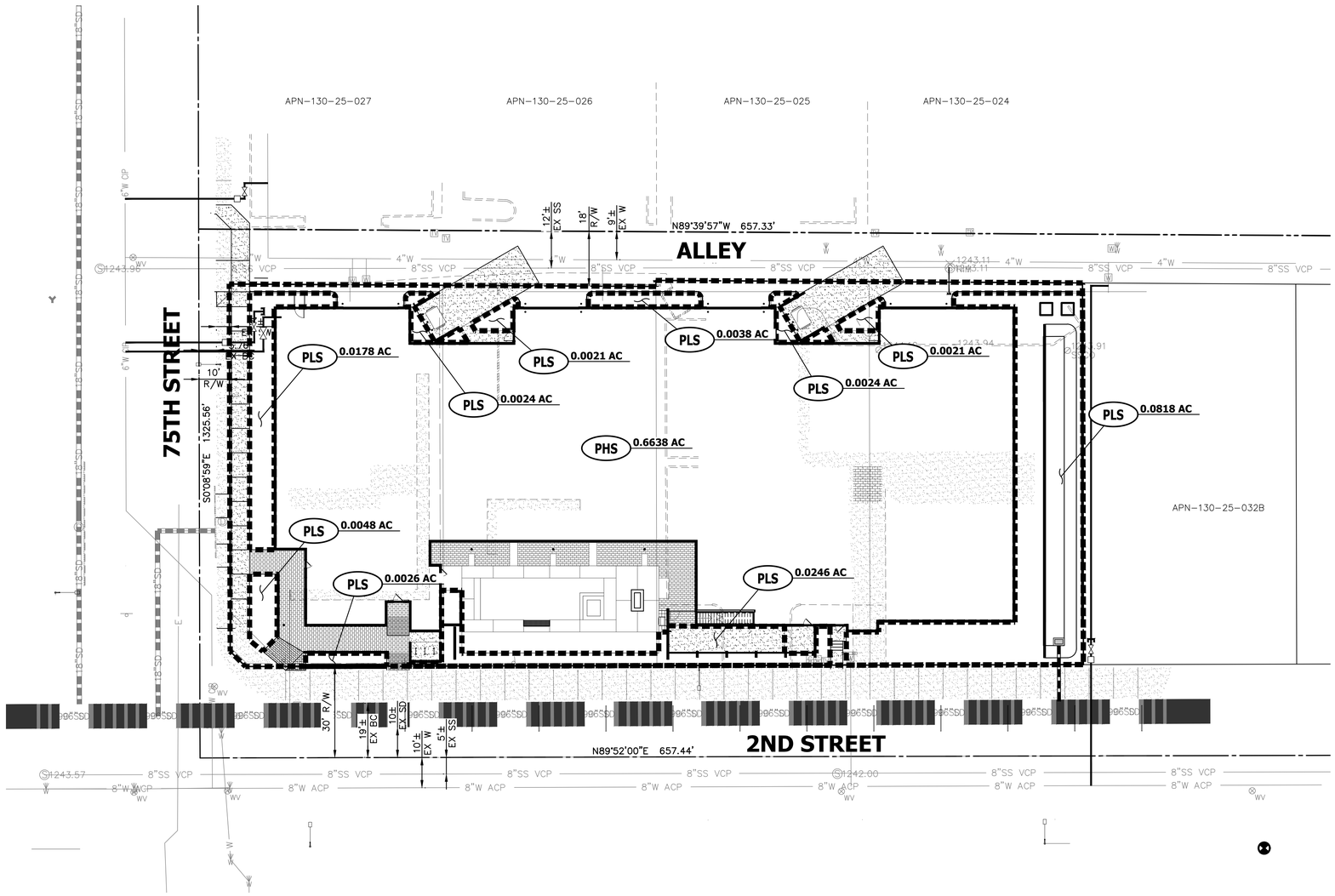
THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME:
75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=20'

SHEET:
1

DRAINAGE EXHIBIT 'B'
PROPOSED CONDITIONS
FOR
75 AND 2ND
7502 E. 2ND STREET
SCOTTSDALE, ARIZONA



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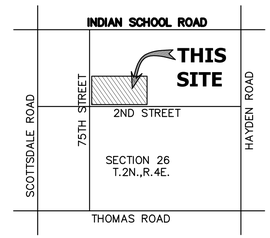
SCALE 1"=20'



VICINITY MAP NTS

OWNER
K&I HOMES
6125 EAST INDIAN SCHOOL ROAD #2005
SCOTTSDALE, AZ 85251
PHONE:(602) 505-2525
CONTACT: MR. KRISTJAN SIGURDSSON
EMAIL: KRISTJANS@KANDIHOMES.COM

CIVIL ENGINEER
HUNTER ENGINEERING, INC.
10450 N. 74TH STREET, SUITE #200
SCOTTSDALE, ARIZONA 85258
PHONE: (480) 991-3985
CONTACT: LARRY TALBOTT, P.E.
EMAIL: LTALBOTT@HUNTERENGINEERINGPC.COM

LEGEND
- 43 — PROPOSED CONTOUR
- PROPOSED STORM LINE
- PROPOSED CATCH BASIN
- PROPOSED FLOW LINE
- PROPOSED GRADE BREAK
- PROPOSED FLOW ARROW
- DRAINAGE AREA BOUNDARY
- PLS 0.000AC — PROPOSED LANDSCAPE
- PHS 0.000AC — PROPOSED HARDSCAPE

NO.	DATE	REVISION	BY

PURPOSE: 1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer CERTIFICATE NO. 42104 LARRY M. TALBOTT 5/9/19 State of ARIZONA U.S.A.

DRAINAGE EXHIBIT 'B' PROPOSED CONDITIONS
FOR
75 AND 2ND
7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
ARIZONA811 BLUE STAKE, INC.
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME: 75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=20'

SHEET: 2

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APPENDIX B
DRAINAGE CALCULATIONS

Retention Basin Calculations

Vr=C*D*A*43,560, C=0.9, D=2.2

Design Storm: 100-year, 2-hour

C = **0.90**
D = **2.20** inches
A = **0.81** Site acres
Vr = **5,822** cubic feet

Pre Vs. Post Analysis

Required

Pre

Location	Type	Area (ac)	C' Coefficient	Depth	Required (cf)
Pre	Weighted	0.8071	0.7284	2.20	4,695
		0.8071			4,695

Post

Location	Type	Area (ac)	C' Coefficient	Depth	Required (cf)
Post	Weighted	0.8071	0.8609	2.20	5,549
		0.8071			5,549

Post	5,549	
Pre	4,695	
Required	854	**cf Req**

Volume Provided

Retention Basin

Elevation	Area (sf)	Avg. Area (sf)	Depth (ft)	Volume (cf)	Σ Volume (cf)
42.0	1,113				
		871	1.00	871	871
41.0	628				

871 cf Prov

Total Retention	
871	**cf Prov**
854	**cf Req**
17	**cf Excess**

Weighted Runoff Coefficient Calculation

Cw=[(C1*A1)+(C2*A2)+(C3*A3)…+(Cn*An)] / Total Area

Project: KAIH013 Calc'd By: LMT

Date: 5/8/2019 Chck'd By: LMT

Pre-Development Conditions

C_1=	0.95	Paving/Roof	A_1=	0.45	Acres
C_2=	0.45	Existing Landsape	A_2=	0.36	Acres
			Total=	**0.81**	Acres

Cw= 0.73

Proposed Conditions

C_1=	0.95	Paving/Roof	A_1=	0.67	Acres
C_2=	0.45	Existing Landsape	A_2=	0.14	Acres
			Total=	**0.81**	Acres

Cw= 0.86

HUNTER
ENGINEERING
CIVIL AND SURVEY

Preliminary Design Report
Sanitary Sewer
For
75 ON 2ND
7502 E. 2ND STREET
Scottsdale, Arizona

Case #2-ZN-2019

April 2019

Prepared by:
Hunter Engineering, Inc.
10450 N. 74th Street, Suite 200
Scottsdale, AZ 85258

PRELIMINARY DESIGN REPORT
SANITARY SEWER
FOR

75 ON 2ND

7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

PREPARED FOR

K&I HOMES
6125 EAST INDIAN SCHOOL ROAD, #2005
SCOTTSDALE, AZ 85251

PREPARED BY

HUNTER ENGINEERING, INC.
10450 N. 74th Street, SUITE 200
SCOTTSDALE, AZ 85258
(480) 991-3985

H.E. PROJECT NO.: KAIH013

TABLE OF CONTENTS

1.0 INTRODUCTION

This sewer report has been prepared under a contract from K&I Homes the architect for the 75 On 2nd project. The purpose of this report is to provide a sewer analysis, as required by the City of Scottsdale, to support this development. This report has been prepared according to the procedures detailed in Chapter 7 of the City of Scottsdale's Design Standards & Policies Manual dated January 2010.

This development project is located at 7502 E. 2nd Street Scottsdale, Arizona 85251. The site is specifically located in The Northwest Quarter of Section 26. Township 2 North, Range 4 East of The Gila And Salt River Base and Meridian. Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

The development is for a proposed 75 on 2nd consisting of approximately 0.81± acres. Improvements to be made on-site include a new building, parking lot, and the construction of landscaped areas. Exhibit A, located in the back pocket, illustrates the proposed improvements for the project.

2.0 EXISTING SITE CONDITIONS

The site is currently developed with existing single-story stucco buildings that were used as single-family residences with parking. The site is bordered by an alley way to the north, 75th street to the west, 2nd street to the south, and small apartment complexes to the east.

There is an existing 8-inch public sewer main in the alley way directly north of the property that runs parallel to 2nd street. There are currently existing sanitary sewer service lines off this line for each existing parcel. There is also an existing 8-inch public sewer main on the south side of 2nd Street. No services are extended to the site from this main. There is an existing 96" storm drain located on the north side of 2nd Street. It is likely that this 96" main precludes the extension of useable services from the 2nd Street sewer main to the site.

3.0 PROPOSED SANITARY SEWER SYSTEM

This development proposes to extend a 6" sewer service from the existing manhole located near the northeast corner of the site. The proposed Building A will have an estimated Average Daily Flow of 6,280 GPD and a Peak Hour Flow of 13 GPM. Wastewater flows were calculated in accordance with the City of Scottsdale Design Standards and Policy Manual (Reference 1). A demand of 0.40gpd per square feet was used for the commercial/retail portion of the building with a peaking factor of 3.0. See the demand calculations in Appendix B.

The calculated proposed flow is well below the available flow of 195 gpm for a 6" service at the minimum slope of 1% and a 0.65 d/D ratio.

4.0 CONCLUSIONS

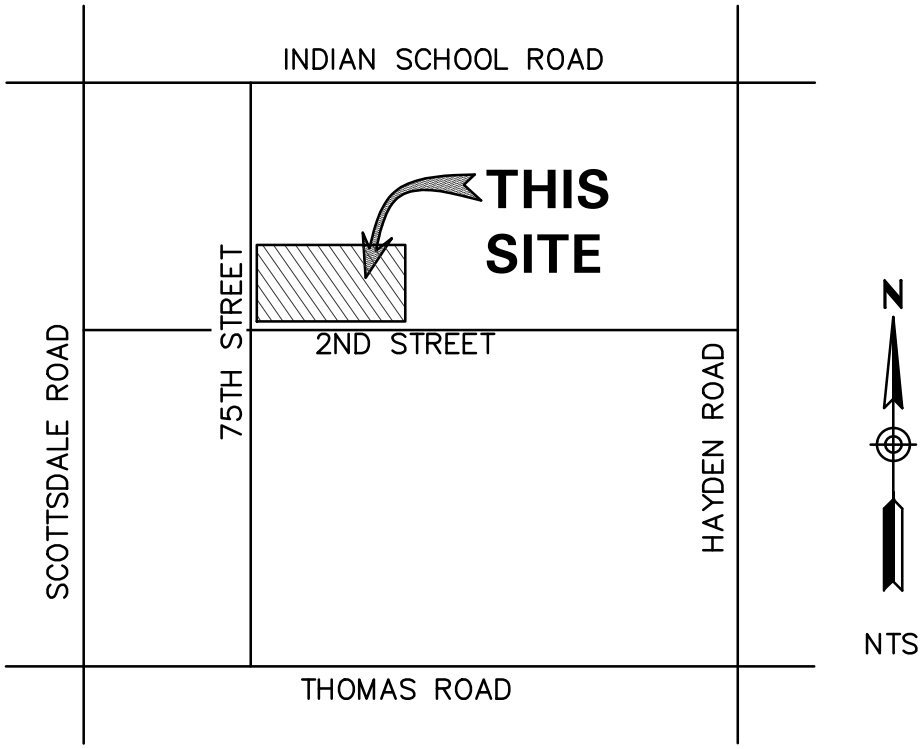
Based on the results of this study, it can be concluded that:

- The proposed sewer system is adequate to service the development.

5.0 REFERENCES

1) *City of Scottsdale Design Standards & Policies Manual*, January 2010.

APPENDIX A
FIGURES



VICINITY MAP
FIGURE 1

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

ABANDON EXIST WATER SERVICE

ABANDON EXIST 4" MAIN IN PLACE

ABANDON EXIST 1" MTR

DOM

FDC

FIRE

MTR

BFP

BFP

CONNECT TO EXISTING WATER MAIN

10' R/W

6' PROP SW

6'± EX BC

5'± EX SW

75TH STREET

ALLEY

18' R/W

12'± EX SS

9'± EX W

PROPOSED BUILDING
FF=44.25

PROP SEWER

ABANDON EXIST 4" MAIN IN PLACE

ABANDON EXIST WATER SERVICE

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

EX 1" METER AND BACKFLOW TO BE USED FOR LANDSCAPE SERVICE

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

30' R/W

19'± EX BC

10'± EX SD

10'± EX W

5'± EX SS

2ND STREET

SCALE 1"=10'

NO.	DATE	REVISION	BY

PURPOSE: 1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
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Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
5/9/19
STATE OF ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR 75 AND 2ND 7502 E. 2ND STREET SCOTTSDALE, ARIZONA

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THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME:
75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=10'

SHEET:
C3

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APPENDIX B
CALCULATIONS

Project: 75 and 2nd
Project No.: KAIH013
City: SCOTTSDALE, AZ
Date: 1/22/2019

PROJECTED MAXIMUM SANITARY SEWER LOADS

I.D.	Land Use	Building Area or Units sq.ft. / Units	Average Day Sewer Demands in Gallons Figure 7.1-2		Peaking Factor Figure 7.1-2	Average Daily Flow gpd	Average Daily Flow gpm	Peak Flow gpm
Building Area A	**Comm/Retail**	20,002	0.50	per sq.ft.	3	10,001	6.9	20.7
	Condo	39	140.00	per unit	4.5	5,460	3.8	17.1
	Sub-Total					**15,461**	**11**	**38**

Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	6" Service
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data			
Mannings Coeffic	0.013		
Channel Slope	010000	ft/ft	
Depth	0.33	ft	d/D=0.65
Diameter	6.0	in	

Results			
Discharge	195	gpm	>38 gpm OK
Flow Area	0.1	ft²	
Wetted Perime	0.95	ft	
Top Width	0.00	ft	
Critical Depth	0.34	ft	
Percent Full	66.0	%	
Critical Slope	0.009559	ft/ft	
Velocity	3.15	ft/s	
Velocity Head	0.15	ft	
Specific Energ	0.48	ft	
Froude Numbe	1.03		
Maximum Disc	271	gpm	
Discharge Full	252	gpm	
Slope Full	0.005974	ft/ft	
Flow Type	Supercritical		

CITY OF SCOTTSDALE

DESIGN STANDARDS & POLICIES MANUAL

LAND USE	DEMAND (gpd)	DESIGN PEAKING FACTOR
Commercial/Retail	0.5 per sq. ft.	3
Office	0.4 per sq. ft.	3
Restaurant	1.2 per sq. ft.	6
High Density Condominium (Condo)	140 per unit	4.5
Resort Hotel (includes site amenities)	380 per room.	4.5
School: without cafeteria	30 per student	6
School: with cafeteria	50 per student	6
Cultural	0.1 per sq. ft.	3
Clubhouse for Subdivision Golf Course	100 per patron x 2 patrons per du per day	4.5
Fitness Center/ Spa/ Health club	0.8 per sq. ft.	3.5

FIGURE 7-1.2 AVERAGE DAY SEWER DEMAND IN GALLONS PER DAY & PEAKING FACTORS BY LAND USE

HYDRAULIC DESIGN 7-1.404

No public SS lines will be less than 8 inches in diameter unless permission is received in writing from the Water Resources Department.

SS lines shall be designed and constructed to give mean full flow velocities equal to or greater than 2.5 fps, based upon Manning's Formula, using an "n" value of 0.013.

To prevent abrasion and erosion of the pipe material, the maximum velocity will be limited to 10 fps at estimated peak flow. Where velocities exceed this maximum figure, submit a hydraulic analysis along with construction recommendations to the Water Resources Department for consideration. In no case will velocities greater than 15 fps be allowed.

Actual velocities shall be analyzed for minimum, average day and peak day design flow conditions for each reach of pipe.

The SS system shall be designed to achieve uniform flow velocities through consistent slopes. Abrupt changes in slope shall be evaluated for hydraulic jump.

The depth to diameter ratio (d/D) for gravity SS pipes 12 inches in diameter and less shall not exceed 0.65 in the ultimate peak flow condition. This d/D ratio includes an allowance for system infiltration and inflow.

The d/D for gravity drains greater than 12 inches diameter shall not exceed 0.70 for the ultimate peak flow condition. This d/D includes an allowance for system infiltration and inflow.

Measures to mitigate hydrogen sulfide shall be analyzed at manhole drops, abrupt changes in pipe slope or direction and at changes in pipe diameter.

MANHOLES AND CLEAN OUTS 7-1.405

Manholes in city streets shall be located near the center of the inside traffic lane, rather than on or near the line separating traffic lanes. Manholes shall not be in bike trails, equestrian trails, sidewalks, crosswalks or wash crossings. Manholes are required at all

HUNTER

ENGINEERING CIVIL AND SURVEY

Preliminary Water Design Report
For
75 on 2ND
7502 E. 2ND Street
Scottsdale, Arizona

Case No. 2-ZN-2019

May 2019

Prepared by:
Hunter Engineering, Inc.
10450 North 74th Street, Suite 200
Scottsdale, AZ 85258

PRELIMINARY WATER DESIGN REPORT
FOR

75 ON 2ND

7502 E. 2ND STREET
SCOTTSDALE, ARIZONA

PREPARED FOR

K&I HOMES
6125 EAST INDIAN SCHOOL ROAD, #2005
SCOTTSDALE, AZ 85251

PREPARED BY

HUNTER ENGINEERING, INC.
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
(480) 991-3985

H.E. PROJECT NO. LGEC202

TABLE OF CONTENTS

1.0 INTRODUCTION

This water report has been prepared under a contract from K&I Homes the architect for the 75 On 2nd project. The purpose of this report is to provide a water analysis, as required by the City of Scottsdale, to support this development. This report has been prepared according to the procedures detailed in Chapter 6 of the City of Scottsdale's Design Standards & Policies Manual dated January 2018.

This development project is located at 7502 E. 2nd Street Scottsdale, Arizona 85251. The site is specifically located in The Northwest Quarter of Section 26. Township 2 North, Range 4 East of The Gila And Salt River Base and Meridian. Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

The development is for a proposed 75 on 2nd consisting of approximately 0.81± acres. Improvements to be made on-site include a new apartment building, parking, and the construction of landscaped areas. The proposed apartment building will also include a parking garage, leasing office and gym. Exhibit A, located in the back pocket, illustrates the proposed improvements for the project.

2.0 EXISTING SITE CONDITIONS

The site is currently developed with existing single-story stucco buildings that were used as single-family residences with parking. The site is bordered by an alley way to the north, 75th street to the west, 2nd street to the south, and small apartment complexes to the east.

There is an existing 4-inch public water main in the alley way directly north of the property that runs parallel to 2nd street. There is also an existing 6-inch public water main in 75th Street and an 8-inch public water main in 2nd Street. There is an existing water service to the site in the alley approximately 50' east of 75th Street and an existing water service off 2nd Street approximately 200' east of 75th Street. Any unused services shall be removed by City staff with the appropriate fees paid.

In addition to the project site services off the existing 4" alley water main there is also a service to the adjacent parcel to the east and another across the alley to the northwest that are service from this 4" main. The 4" main does not meet city minimum line size standards.

3.0 EXISTING WATER DISTRIBUTION SYSTEM

Since the 4" main in the alley is too small in diameter this development will bring new domestic and fire services off of 75th Street. The existing 4" main in the alley will be abandoned in place and the existing service off 2nd Street will be utilized for landscape irrigation.

A new service will be provided for the adjacent eastern property from 2nd Street and for the west property north of the alley off 75th Street. Per coordination with Levi Dillon, Sr. Water Resources Engineer, the city will work the developer and the other property owners to help facilitate the new services and line abandonment. See email in Appendix D.

4.0 PROPOSED DOMESTIC WATER DEMAND

The average day, maximum day and peak hour demands for this development were derived using unit flow requirements out of the City of Scottsdale Design Standards & Policies Manual for Water, Figure 6.1-2. Refer to Appendix D in this report. Average Day Demand (ADD), Maximum Day Demand (MDD) and Peak Hour Demand (PHD) for domestic water usage for each building are located in Appendix B. Maximum Day Demand is 2 times the ADD and Peak Hour Demand is 3.5 times the ADD.

Land Use	**Building Area or Units** **sf** **Units**	**Average Daily Flows by Land Use** Table 6. 1-2 Avg Daily Flows Design Standards Manual For Water and Wastewater Systems		**Average Daily Flow (ADF)** **gpd**	**Average Daily Flow (ADF)** **gpm**	**Maximum Daily Flow (ADF * 2)** **gpm**	**Peak Flow (ADF * 3.5)** **gpm**
Comm/Retail	20,002	0.00111	gals per s.f.	31,971	22.2	44.4	77.7
Condo	39	0.27000	gals per s.f.	15,1653	10.5	21.1	36.9
TOTAL:				**47,134**	**32.7**	**65.5**	**114.6**

5.0 PROPOSED FIRE FLOW DEMAND

The proposed system was modeled using WATERCAD, a pipe network analysis program by Haestad Methods. A reservoir and pump were added to the model near the hydrant flow test location to simulate the pressure versus flow curve. The model has been calibrated to match the results of the hydrant test. Note that the pipe (Model pipes connecting the pump and reservoir are not a part of the system and are oversized to 120-inch to minimize system losses. Pipes and junctions were added to the network model matching the pipe sizes, materials and elevations of the proposed system.

The model is completed as a closed system without extensive information from the entire city pipe network, which is not feasible for the requirements of this report. A closed system is conservative having one-point source of water supply and pressure whereas the existing system can have multiple supply sources feeding the pipe network surrounding the development. The flow test should be representative of the demand adjacent properties have on the system. The

hydrant flow test results reflect the time and location of the test. Refer to Appendix C for Fire Flow Test results.

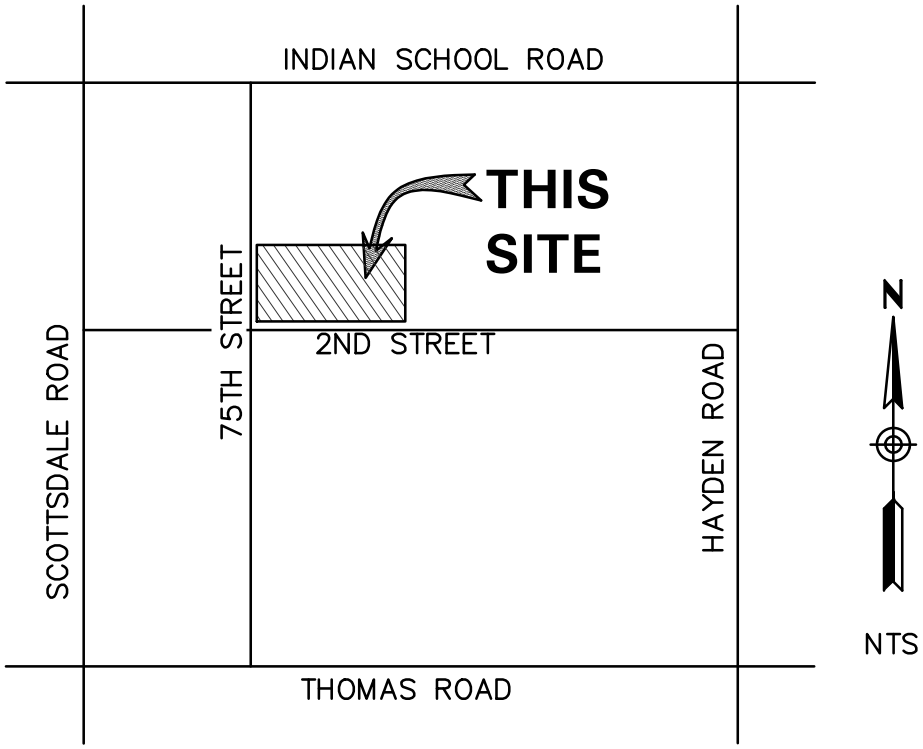
The proposed Occupancy Class is S-2 for the Parking Garage, B for the leasing and gym and R-2 for the Apartments. Per the International Fire Code (IFC), the maximum fire flow is based on the construction type of the building and its square footage. The total building area is 70,065 sf. The building construction type is V-A. This requires a fire flow of 4,750 GPM be achieved at a minimum pressure of 20 PSI. The proposed building will be sprinklered. Therefore, a 50% reduction in the fire flow requirement may be applied. This reduces the required fire flow to 2,375 GPM. The resultant pressure for the fire flow is 62 psi which is more than the minimum required 20 psi. Results from the WaterCAD analysis are summarized below with calculations and detailed results in Appendix B.

6.0 CONCLUSIONS

Based on the results of this study, it can be concluded that:

- The proposed water network meets the requirements to support this development.
- Results of the WaterCAD model indicate that the proposed water network does provide the needed fire flow and pressure to service this development.
- All domestic water lines and firelines shall be privately owned and maintained.

APPENDIX A
FIGURES



VICINITY MAP
FIGURE 1

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

ABANDON EXIST WATER SERVICE

ABANDON EXIST 4" MAIN IN PLACE

ABANDON EXIST 1" MTR

DOM

FDC

FIRE

MTR

BFP

BFP

CONNECT TO EXISTING WATER MAIN

10' R/W

6' PROP SW

6'± EX BC

5'± EX SW

75TH STREET

ALLEY

18' R/W

12'± EX SS

9'± EX W

PROPOSED BUILDING
FF=44.25

PROP SEWER

ABANDON EXIST 4" MAIN IN PLACE

ABANDON EXIST WATER SERVICE

CONNECT TO EXISTING WATER SERVICE LINE TO BUILDING. TO BE COORDINATED WITH PROPERTY OWNER

APPROXIMATE LOCATION OF PROPOSED SERVICE TO BE COORDINATED WITH PROPERTY OWNER

EX 1" METER AND BACKFLOW TO BE USED FOR LANDSCAPE SERVICE

PROPOSED SERVICE TO REPLACE ABANDONED SERVICE IN ALLEY

30' R/W

19'± EX BC

10'± EX SD

10'± EX W

5'± EX SS

2ND STREET

SCALE 1"=10'

NO.	DATE	REVISION	BY

PURPOSE: 1ST CONCEPTUAL SUBMITTAL

DESIGN BY: LMT
DRAWN BY: GM
CHECKED BY: LMT

HUNTER ENGINEERING
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10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
5/9/19
STATE OF ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR 75 AND 2ND 7502 E. 2ND STREET SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
AR ZONA811
BLUE STAKE, INC.
CALL 811 OR CLICK ARIZONA811.COM

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PROJECT NAME:
75 AND 2ND

HE NO.: KAIH013
SCALE: 1"=10'

SHEET:
C3

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APPENDIX B
CALCULATIONS AND DATA SHEET

Project: 75 on 2nd
Project Number: KAIH013
City: Scottsdale
Date: 1/31/2019

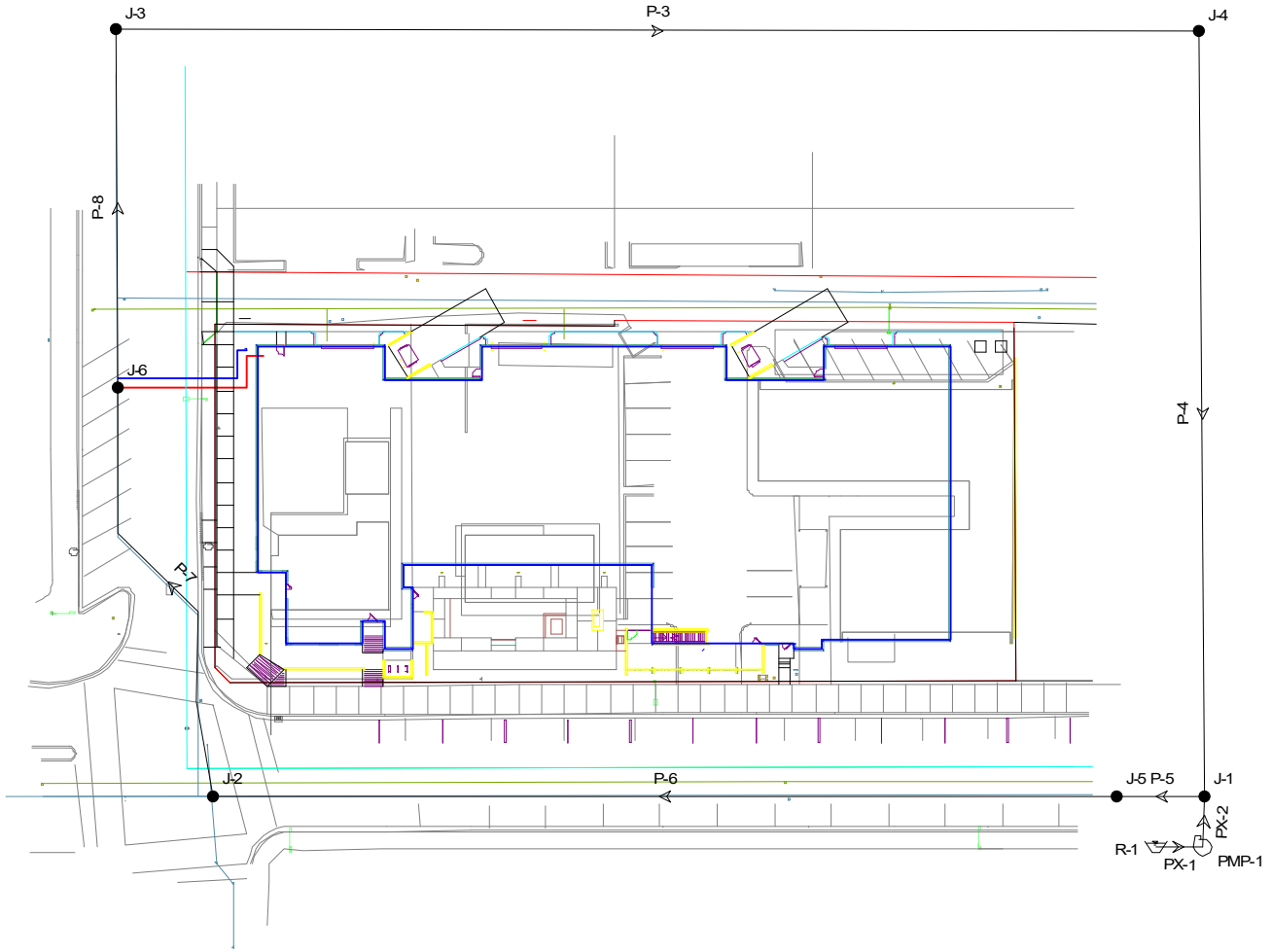
PROJECTED MAXIMUM DOMESTIC WATER DEMANDS

I.D.	Land Use	Building Area or Units sf Unit	Average Daily Flows by Land Use Table 6-1.2 Avg Day Water Dem Design Standards Manual For Water and Wastewater Systems		Average Daily Flow (ADF) gpd	Average Daily Flow (ADF) gpm	Maximum Daily Flow (ADF * 2) gpm	Peak Flow (ADF * 3.5) gpm
Building A	**Mixed Use**	20,002	0.00111	gals per s.f.	31,971	22.2	44.4	77.7
	Condo	39	0.27000	gals per unit	15,163	10.5	21.1	36.9
	TOTAL:				**47,134**	**32.7**	**65.5**	**114.6**

FIRE FLOW SUMMARY

I.D.	Proposed Building Type	Building Area squate feet	Estimated Construction Type	Minimum Required Fire Flow, Table B105.1 2009 Internation Fire Code	50% Sprinklered Fire Flow	Building Sprinklered
				(gpm)	(gpm)	
Building A	Mixed Use	70,065	V-A	4,750	2,375	YES

Scenario: Hydrant Test 3



Hunter Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Peak
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-3	690.00	6.0	Cast iron	130.0	-44.35	246.63	246.79
P-4	350.00	12.0	Cast iron	130.0	-44.35	246.79	246.80
PX-1	1.00	120.0	Ductile Iron	130.0	114.60	39.00	39.00
PX-2	1.00	120.0	Ductile Iron	130.0	114.60	246.80	246.80
P-5	335.00	8.0	Asphalted cast iron (r	130.0	70.25	246.80	246.75
P-6	340.00	8.0	Asphalted cast iron (r	130.0	70.25	246.75	246.70
P-7	198.00	6.0	Cast iron	130.0	70.25	246.70	246.60
P-8	152.00	6.0	Cast iron	130.0	-44.35	246.60	246.63

Scenario: Peak
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.80	89.90
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.70	88.99
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.63	88.53
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.79	89.47
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.75	89.02
J-6	44.00	Zone	Demand	114.60	Fixed	114.60	246.60	87.65

> 50 psi OK

Scenario: Fire
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	216.63	76.85
J-2	41.03	Zone	Demand	1,000.00	Fixed	1,000.00	189.75	64.34
J-3	42.00	Zone	Demand	1,000.00	Fixed	1,000.00	186.95	62.71
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.12	76.20
J-5	41.00	Zone	Demand	375.00	Fixed	375.00	200.24	68.90
J-6	44.00	Zone	Demand	65.50	Fixed	65.50	187.89	62.26

> 20 psi OK

Scenario: Hydrant Test 1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.95
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	246.90	89.07
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	246.90	88.65
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	246.90	89.08
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	246.90	87.79

Matches Hydrant Test OK

Scenario: Hydrant Test 2
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	2,430.00	Fixed	2,430.00	216.87	76.96
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	216.87	76.08
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	216.87	75.66
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.52
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	216.87	76.09
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	216.87	74.79

Matches Hydrant Test OK

Scenario: Hydrant Test 3
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	39.00	Zone	Demand	6,031.00	Fixed	6,031.00	85.20	19.99
J-2	41.03	Zone	Demand	0.00	Fixed	0.00	85.20	19.11
J-3	42.00	Zone	Demand	0.00	Fixed	0.00	85.20	18.69
J-4	40.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.56
J-5	41.00	Zone	Demand	0.00	Fixed	0.00	85.20	19.12
J-6	44.00	Zone	Demand	0.00	Fixed	0.00	85.20	17.83

Matches Hydrant Test OK

Detailed Report for Pump: PMP-1

Note:
The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary					
X	699,451.47	ft	Upstream Pipe	PX-1	
Y	906,247.77	ft	Downstream Pipe	PX-2	
Elevation	39.00	ft			

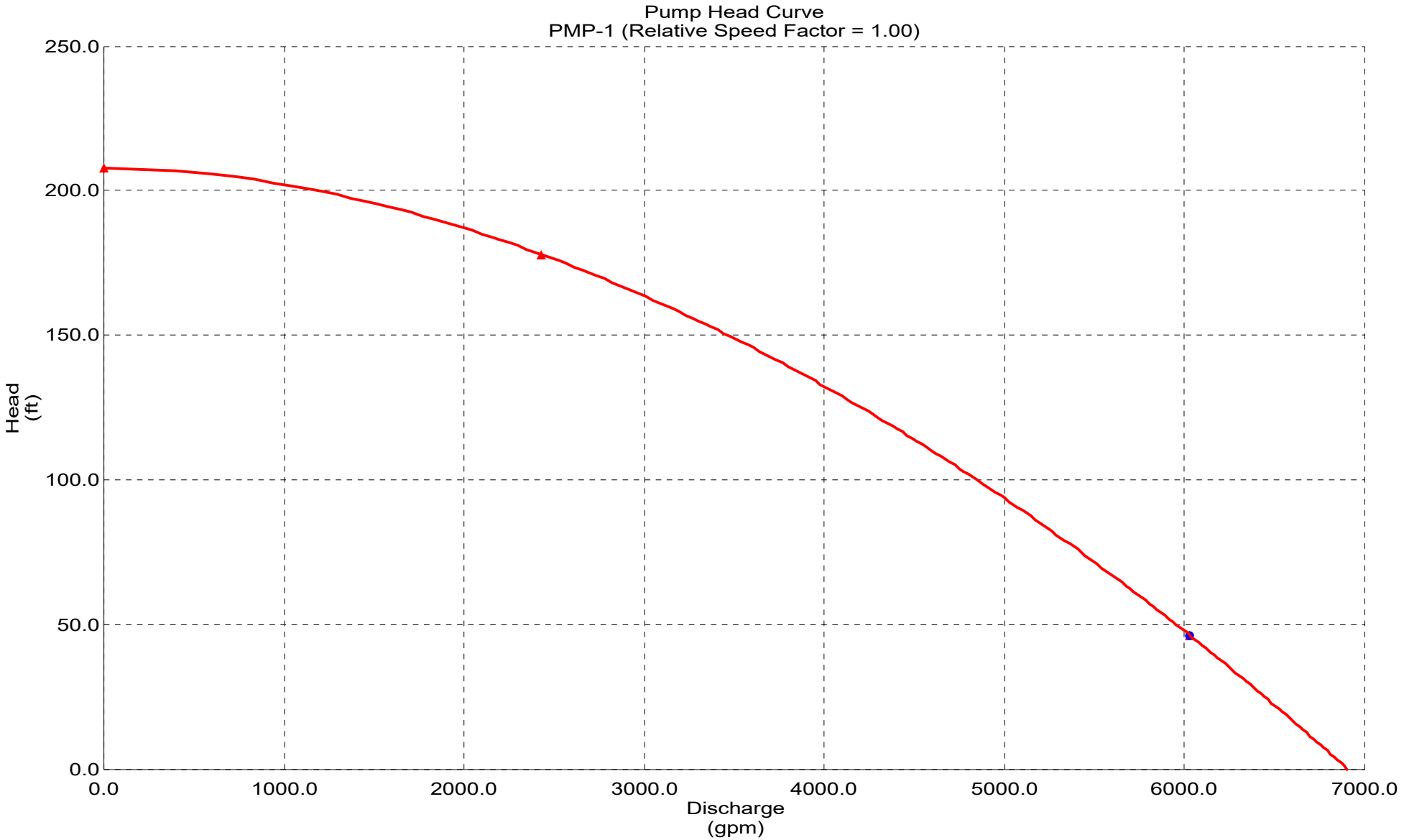
Pump Definition Summary	
Pump Definition	Default Pump Definition

Initial Status			
Initial Pump Status	On	Initial Relative Speed Facto	1.00

Calculated Results Summary

Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0.00	On	39.00	85.20	3,031.00	46.20	1.00	70.35

Detailed Report for Pump: PMP-1



Detailed Report for Reservoir: R-1

Note:
The input data may have been modified since the last calculation was performed.
The calculated results may be outdated.

Scenario Summary	
Scenario	Hydrant Test 3
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Hydrant Test 3
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	699,435.02 ft	Elevation	39.00 ft
Y	906,248.15 ft	Zone	Zone

Calculated Results Summary

Time (hr)	Calculated Hydraulic Grade (ft)	Inflow (gpm)	Outflow (gpm)
0.00	39.00	3,031.00	,031.00

APPENDIX C
FIRE HYDRANT TEST

SUMMIT FIRE PROTECTION CO.

Phone: (480) 966-9178 Fax: (480) 967-9191 AZ Lic. C-16 275324
2114 East Cedar Street • Tempe, Arizona 85281
E-mail Address: EBeckman@SummitCoUS.com

FIRE HYDRANT FLOW TEST

Name: 75 on 2nd
NEC 75th Street & 2nd Street
Scottsdale, AZ

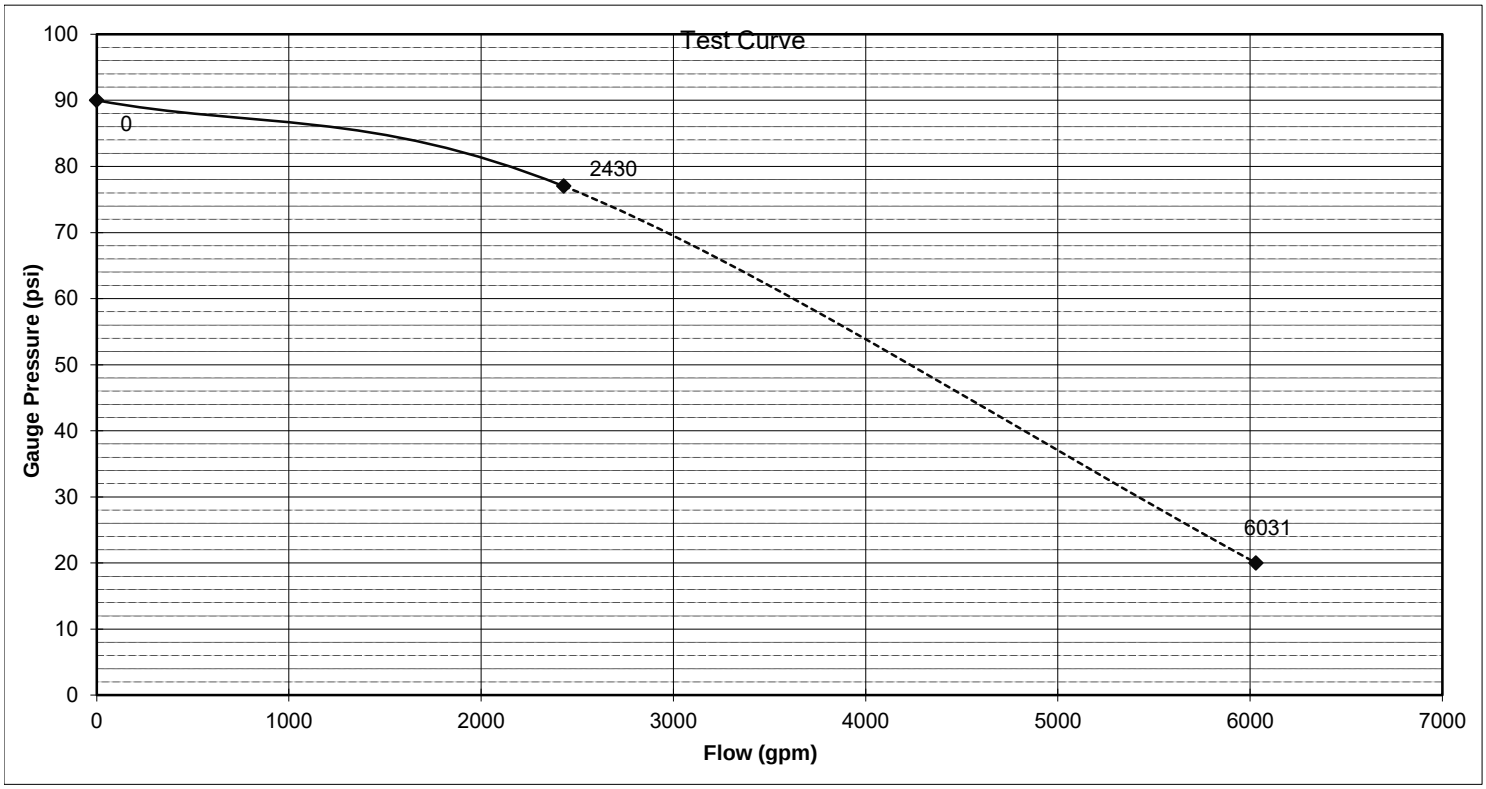
Date: 02/12/19
Time: 7:00 AM
Report #
Tech: Jeff Gauthier

Static Hydrant: SWC of Miller Road and 2nd St.
Flowing Hydrant: SWC of 75th St and 2nd St

Elevation:
Elevation: 0
Dist. Between Hydrants: 500'-0"
Type of Supply: City Main
Diameter of Main:
Static Pressure: 90.0
Residual Pressure: 77.0
Pump Present:
Tank Present:
Req. GPM: Req. PSI:

Hydrant:	1	2	3	4
Outlet Diameter:	4.0			
Pitot Reading:	32.0			
Coeff:	0.900			
Discharge GPM:	2430	0	0	0

Static pressure of	90	psi	@	0	gpm
Residual pressure of	77	psi	@	2430	gpm
Available flow @	20	psi	@	6031	gpm



Comments:

NOTES:

1. Flowing hydrant is assumed to be on a circulating main or downstream of the pressure test hydrant on a dead-end system.
2. Flow analysis assumes a gravity flow system with no distribution pumps and having no demand, other than the test
3. The distance between hydrants, elevations & main diameters are for information only.

APPENDIX D
REFERENCE INFORMATION

Larry Talbott

Subject: FW: 690-PA-2018 75 on 2nd

From: Dillon, Levi <LDillon@Scottsdaleaz.gov>
Sent: Tuesday, May 7, 2019 4:57 PM
To: Kristjan Sigurdsson <kristjans@kandihomes.com>; Larry Talbott <ltalbott@hunterengineeringpc.com>
Subject: RE: 690-PA-2018 75 on 2nd

Hello Larry and Kristjan,

I've discussed all of this with Water Resources' management. Current standards require that a water service be brought directly (perpendicular) from the water main and it cannot cross other private property. This means that your proposal to use the existing landscape meter will not be acceptable. **However**, I think you'll find that the proposal below takes this portion of the work entirely out of the discussion.

Water Resources proposes the following work division for relocating the water services so that the 4" dead-end line can be removed from service:

1. Pending all 4" line service relocations: Water Resources will allow for the 4" line to be properly abandoned in place. 75 on 2nd will be responsible for the abandonment of the portions along their alley frontage.
2. Water Resources will address the tee and valve associated with the 4" water line.
3. Water Resources will take responsibility for providing new water service connections for the two-remaining services on the 4" line up to the property lines.
    a. 7503 E 1st street: Water Resources will install new tap and service line off of 75th Street and connect to the existing meter.
    b. 7526 E 2nd Street: Water Resources will install a tap and service line for from the water main on 2nd street north across the street up to the property line. The City will also set the new meter on the south side of the property (if this location is possible, see item 4).
4. Water Resources requests that 75 on 2nd evaluate and address only the private property segment of the work associated with relocating the water service line/or building supply line for 7526 E 2nd. The City will perform initial coordination with the homeowner to inform them of the need to relocate the service and obtain consent. Following this, 75 on 2nd would need to coordinate with the homeowner and provide the evaluation, design, planning, permitting, and contractor services required to effectively relocate the private property portion of either the building supply line(s) or the service line for 7526 by one of the following methods:
    a. **Method#1**: Running the building supply line from the new City supplied meter on the south side of the property to the alley side of the property and connecting to the existing building supply connection. Note: If it not feasible to place a new meter on the south side then the new service line will need to be routed through private property to the existing or new meter on the north side. OR;
    b. **Method #2:** Running the building supply line from the new meter on the south side through private property and making a new building connection on the property that will ensure water service equivalent to existing. Note: this could involve external landscape irrigation mods and internal plumbing mods.
    c. Notes:
        i. The service line is defined as the line from main to meter
        ii. The building supply line is from meter to building
        iii. The City would need to review and approve either proposed modifications through the typical permit application and review/approval process.

Hopefully with this approach we can effectively achieve compliance with current design standards. Let me know when possible if you and your client agree to proceed as described above.

Thank you,

Levi C. Dillon, P.E. | *Sr. Water Resources Engineer*

SCOTTSDALE WATER

"Water Sustainability through Stewardship, Innovation and People"

Contact Info
Direct: (480) 312-5319
Main office: (480) 312-5685
Fax: (480) 312-5615
Mailing/Office Address
Water Resources Administration
9379 E. San Salvador Dr.
Scottsdale, AZ. 85258

Sending me an attachment over 5MB? Please use the link below:
https://securemail.scottsdaleaz.gov/dropbox/ldillon@scottsdaleaz.gov

CITY OF SCOTTSDALE

DESIGN STANDARDS & POLICIES MANUAL

DESIGN FLOW & HEAD LOSS 6-1.404

The ultimate design flow within the city's water transmission and distribution system will be based on the city's current Integrated Water Master Plan. Water demand for each development will be calculated using the average day demands, as shown in Figure 6-1.2, to ensure that the existing distribution supply is sufficient. Designs will include all necessary improvements, including booster pumping stations, reservoirs, lines and appurtenances to meet the system's ultimate demand.

A. The four hydraulic modeling scenarios detailed in 6-1.202 will demonstrate that the system is adequately designed.
B. Select model scenario flows and their respective peaking factors are as follows:
   1. Maximum day: Defined as 2 times the average day total use flow as determined per Figure 6-1.2 (use gpm value).
   2. Peak hour: Defined as 3.5 times the average day total use as determined per Figure 6-1.2 (use gpm value).
   3. Note: These peaking factors shall be appropriately increased for restaurants and high-demand water users, or as designated by the Water Resources Department after review.
C. The maximum allowable pipe head loss for the various water pipelines is as follows:
   1. Transmission mains: 8 feet per 1,000 feet (3.5 psi per 1,000 feet)
   2. Distribution lines: 10 feet per 1,000 feet (4.3 psi per 1,000 feet)
   3. Service lines – domestic, dedicated fire, or combined domestic/fire: size as required to satisfy both hydraulic modeling requirements and Fire Code. Generally, velocities of more than 5 feet per second are undesirable. Velocities more than 7.5 feet per second are not allowed.
   4. As otherwise designated by the Water Resources Department

SYSTEM FLOW TEST REQUIREMENTS & USE OF RESULTS 6-1.405

Pressure and available flow information for existing water lines must be obtained by having a fire hydrant flow test performed on the system. Hydrant flow tests are required for the following situations:

A. On all commercial projects, multi-family residential projects, and public extensions of the city's water distribution system.
B. For any proposed system connecting to the existing distribution system, the design capacity of the existing system (flow versus pressure) will need to be determined by the engineer.
C. Prior to acceptance by the city, all platted subdivisions shall conduct an additional flow test at the lowest and highest elevation available in which the development is constructed.
D. Developments that cross pressure zone boundaries must conduct a flow test within each pressure zone.

A private fire protection company shall perform the tests and certify the results. A right-of-way permit issued by the One Stop Shop is required for a flow test and the Inspection Services Division will be notified a minimum of 48 hours before performing the flow test. The permit is also available online. Refer to the flow test design form.

d. Pipe flow velocity in feet per second (fps)
e. Each pipe segment's head loss rate (ft. /1,000ft or psi/ft.)
f. PRVs: Upstream and downstream pressures (psi or HGL elevation)
g. Tanks: Inflow and outflow (gpm)
h. Shows all units for the values presented or provide a legend on the diagram page that indicates the units used

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Land Use	Inside Use	Outside Use	Total Use	Inside Use	Outside Use	Total Use	Units
Residential Demand per Dwelling Unit							
< 2 dwelling unit per acre (DU/ac)	208.9	276.7	485.6	0.30	0.39	0.69	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	0.27	0.39	0.66	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	0.25	0.11	0.36	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
12 – 22 DU/ac	155.3	72.3	227.6	0.22	0.11	0.33	per unit
High Density Condominium (condo)	155.3	30	185.3	0.22	0.05	0.27	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	0.56	0.07	0.63	per room
Service and Employment							
Restaurant	1.2	0.1	1.3	1.67E-03	1.39E-04	1.81E-03	per square foot (sq.ft.)
Commercial/ Retail	0.7	0.1	0.8	9.73E-04	1.39E-04	1.11E-03	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.
Institutional	670	670	1340	0.94	0.94	1.88	per acre
Industrial	873	154	1027	1.22	0.22	1.44	per acre
Research and Development	1092	192	1284	1.52	0.27	1.79	per acre
Special Use Areas							
Natural Area Open Space	0	0	0	0.0	0.0	0.0	per acre
Developed Open Space – Parks	0	1786	1786	0.0	2.49	2.49	per acre
Developed Open Space – Golf Course	0	4285	4285	0.0	5.96	5.96	per acre

Notes:
(1) These values shall not be used directly for service line or water meter sizing.
(2) Gallon per day values are provided for reference only. The instantaneous gallon per minute flow rates presented are intended for use in the required hydraulic modeling scenarios. The gpm values assume a 12-hour active water use period per 24-hour day. In large or specialty developments or master plans the hydraulic analysis criteria and parameters should be discussed with the Water Resources Department. Seasonal peaking should also be considered. Upon review, the Water Resources Department reserves the right to designate flows to be used in hydraulic modeling scenarios that may be different from those presented here.
(3) The hydraulic modeling peaking factors used in select modeling scenarios are to be applied to the gpm values shown here. Max day and peak hour peaking factors can be found in Section 6-1.404.

FIGURE 6-1.2 AVERAGE DAY WATER DEMANDS

SECTION B101
GENERAL

B101.1 Scope.

The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

SECTION B102
DEFINITIONS

B102.1 Definitions.

For the purpose of this appendix, certain terms are defined as follows:

FIRE FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

FIRE-FLOW CALCULATION AREA. The floor area, in square feet (m^2), used to determine the required fire flow.

SECTION B103
MODIFICATIONS

B103.1 Decreases.

The *fire code official* is authorized to reduce the *fire-flow* requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full *fire-flow* requirements is impractical.

B103.2 Increases.

The *fire code official* is authorized to increase the *fire-flow* requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall be not more than twice that required for the building under consideration.

B103.3 Areas without water supply systems.

For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the *fire code official* is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code*.

SECTION B104
FIRE-FLOW CALCULATION AREA

B104.1 General.

The *fire-flow calculation area* shall be the total floor area of all floor levels within the *exterior walls*, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

B104.2 Area separation.

Portions of buildings that are separated by *fire walls* without openings, constructed in accordance with the *International Building Code*, are allowed to be considered as separate *fire-flow calculation areas*.

B104.3 Type IA and Type IB construction.

The *fire-flow calculation area* of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

Exception: *Fire-flow calculation area* for open parking garages shall be determined by the area of the largest floor.

SECTION B105
FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.

The minimum *fire-flow* and flow duration requirements for one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.1(1) and B105.1(2).

TABLE B105.1(1)
REQUIRED FIRE FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

FIRE-FLOW CALCULATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURAT (hours)
0–3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B at the required fire-
0–3,600	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	500	$^1/_2$
3,601 and greater	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	$^1/_2$ value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m.

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
145,901-	82,101-92,400	52,501-59,100	37,901-42,700	23,301-	4,250	

164,200				26,300		
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	4
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a.Types of construction are based on the *International Building Code*.

b.Measured at 20 psi residual pressure.

B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.

The minimum *fire-flow* and flow duration for buildings other than one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.2 and B105.1(2).

TABLE B105.2
REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the *International Fire Code*	25% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*	25% of the value in Table B105.1(2)[b]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.

a. The reduced fire flow shall be not less than 1,000 gallons per minute.

b. The reduced fire flow shall be not less than 1,500 gallons per minute.

B105.3 Water supply for buildings equipped with an automatic sprinkler system.

For buildings equipped with an *approved automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The *automatic sprinkler system* demand, including hose stream allowance.
2. The required *fire flow*.

SECTION B106
REFERENCED STANDARDS

ICC IBC—18	International Building Code	B104.2
ICC IWUIC—18	International WildlandUrban Interface Code	B103.3
ICC IRC—18	International Residential Code	Table B105.1(1)
NFPA 1142—17	Standard on Water Supplies for Suburban and Rural Fire Fighting	B103.3